MINNESOTA COUNTY BIOLOGICAL SURVEY: 1988 BIRD SURVEYS

by
Bonita Eliason
Minnesota Department of Natural Resources
Section of Wildlife - Natural Heritage Program

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The following supplementary materials are attached to the original copy of this report that can be found in Heritage/Nongame files.

1. Site logs: There is one site log for each county that is a comprehensive listing of information on all sites surveyed, including site number, name, location, species expected, date surveyed, and listed species observed.

2. County maps of 6 western CBS counties with bird survey sites highlighted.

3. Washington county map showing driving route and playback stops for Red-shouldered Hawk survey.

4. Topographic maps of Washington county showing canoe, pontoon, and motorboat route and playback stops for Red-shouldered Hawk and Louisiana Waterthrush.

I. WESTERN COUNTIES (Lac Qui Parle, Big Stone, Traverse, Wilkin, Clay, Norman)

GOALS

The goals of the bird survey work in the six western counties were: 1) to determine the distribution of listed species of birds on a subset of sites known to possess high quality plant communities, 2) to prepare a species list for each site with minimum estimates of abundance, and 3) to acquire records of listed species for the Natural Heritage database by documenting the locations of any listed species on the survey sites, and obtaining evidence of breeding by those species whenever possible.

AMOUNT OF FIELD WORK COMPLETED

Field work was conducted between 15 May and 5 July (Table 1). A total of 181 sites were surveyed (Table 2). Original site logs showing site number, name, locations, species expected, date surveyed, and species found are attached. Arlene Rothstein and Bruce Harris surveyed 151 sites, 17 were surveyed by Lee Pfannmuller and John Schladweiler, and 13 were surveyed by 4 volunteers from the Minnesota Ornithologists' Union. This involved a total of 82 person-days of work. The total acreage surveyed on these sites was 17,040 acres (Table 3). Because of the extremely dry weather, very little field time was lost to rain.

SUMMARY OF RECORDS OBTAINED

One or more listed species was observed on 96 (53%) of the sites surveyed. One hundred and thirty-one records for the Natural Heritage database were collected during the actual survey work, and an additional 28 records were collected in the form of incidental observations while driving through the survey counties (Table 4). Almost three-fourths of these records were for Upland sandpipers, 25% were of Marbled godwits and the rest were comprised of 8 other listed species (Table 3, 4). Eleven new county records were obtained (Tables 5, 6). A breakdown of the database categories of records for Upland sandpipers, Marbled godwits, and Wilson's phalaropes is shown in Appendix 1. In tabulating these numbers, I have omitted observations that appeared to be updates of existing records in the Natural Heritage program database, but it is possible that different decisions will be made when the new and old records are compared at the time of data entry. When data entry of 1988 records is completed, the number of records can be more accurately determined by doing a computer run.

I also tabulated observations of two non-listed species, Northern harrier and Dickcissel (Tables 7, 8). Information on Northern harriers is of interest because both their range and abundance in the state have been noticeably reduced since 1970 (Janssen 1987). Dickcissels are of interest because their distribution and abundance tends to fluctuate dramatically from one year to the next. They were unusually common in 1988.

EVALUATION OF METHODS

Selection of species

Rare birds on which 1988 survey efforts were focused are shown in Tables 5 and 6, as are the counties in which they are likely to occur. These species are a subset of those listed in the 1984 official state list of endangered, threatened, and special concern species. The 18 targeted species and the priorities assigned to them were selected based on conversations with Lee Pfannmuller and Jan Green. Criteria are given in the figure legends.

EVALUATION: Of the 8 species rated as top priority, the best information was obtained for 4 (Upland sandpiper, Marbled godwit, Red-shouldered hawk, and Louisiana waterthrush). In addition, I feel that good information, although negative, was obtained for Sprague's pipit and Baird's sparrow, because most of the available habitat for these species in the 6 counties was surveyed. The quality of information obtained for each of the 18 species is evaluated in the species accounts found in section 3 of this report.

Site selection

In the process of deciding on a survey method, I reviewed current literature on avian census techniques. I concluded that assessing the distribution and abundance of the 18 species of interest accurately and comprehensively throughout the survey counties was not feasible, since it would require expenditures far beyond those budgeted for the project. I decided that the most practical way to limit the scope of the work would be to focus survey efforts on sites that had already been classified as high quality by County Biological Survey botanists. The bird survey information could thus be used to help set priorities for acquisition of sites that would effectively preserve the maximum number of natural features.

Three additional criteria were used in site selection: 1) Sites providing potential habitat for species of primary interest were selected in preference to those providing habitat for species of secondary interest (see Tables 5 and 6 for species' priorities). 2) Sites 160 acres in size or larger were chosen preferentially over smaller sites. 3) Sites with very difficult access (involving more than 30 minutes of walking to beginning of survey) or large areas of impassable vegetation were avoided.

Once these criteria had been defined, the process of site selection involved conferring with botanists Robert Dana and Carmen Converse, who had done the plant survey work in the 6 western CBS counties. I described habitat preferences of the priority species to them, and they suggested potential sites to me, using site size, plant community quality, and accessibility as the three major criteria. I then followed up these discussions by perusing the site survey forms and maps for each of the recommended sites to determine potential sub-sites of appropriate size. Some sites with especially high quality plant communities were included regardless of their potential as habitat for listed birds, in order to provide a bird species list to be attached to other site information. In Big Stone county, where much of the plant work remained to be done, sites were chosen based on Robert Dana's perceptions from examining aerial photography and prairie tax credit information.

EVALUATION: I was satisfied with the results of the site selection process. Information provided by the botanists expedited field work in many ways, from providing information on access points to identifying landowners. The process resulted in the selection of a manageable number of sites.

Limiting survey work to high quality sites precludes generalizing about use by priority species of other sites, but represents a realistic compromise that preserves the most important goals of the project. As predicted, the method gave most information for Upland sandpiper and Marbled godwit. To obtain good information on very rare species would require a species by species approach, and a much greater time investment.

County by county description of sites

Lac Qui Parle: Bird survey sites were distributed across all of the areas where high quality native prairie remains in the county. The largest number of sites were located in the northern part of the county in a line along Marsh and Lac Qui Parle lakes and the Minnesota river. A few sites were located in the southeastern part of the county (Camp Release twp.) and the southwestern part of the county (Mehurin, Garfield and Freeland twps.).
Big Stone: Most of the bird survey sites were along the southern border of the county, north of Big Stone and Marsh lakes and the Minnesota River.
Traverse: All but 2 of the bird survey sites in Traverse county were hill prairies located along L. Traverse in the southwestern part of the county. Upland sandpiper habitat was relatively limited, and fragmented by wooded ravines.
Wilkin: Bird survey sites were mostly concentrated in the Rothsay macropreserve area with a few scattered immediately north, south and west of that area.
Clay: Bird survey sites were confined to the eastern half of the county with concentrations in the Felton and Bluestem Prairie areas and in the southeastern part of the county.
Norman: All but one of the bird survey sites were in the southeastern part of the county.
(A comprehensive list of sites surveyed is given in the site logs which are attached to this report.)

Survey method

Given the broad geographic area to be covered, it was decided that information on distribution should take precedence over accurate assessment of densities. This resulted in maximizing the number of sites visited, but each site was visited only once. The survey method involved walking across the site on parallel paths that were 200 m apart, and recording on a data sheet all birds observed within 100 m on either side of the transect. The spacing of the survey paths was selected to maximize coverage of the plot, and minimize the probability of recording the same individual more than once. The survey unit was a quarter section whenever possible; the proscribed method resulted in the survey of 100 acres (because a boundary strip 100 m wide was not sampled). Some sites were smaller than 160 acres, and these were often irregularly shaped. Field workers adapted the plan to irregularly shaped sites or those with impassable obstacles.

EVALUATION: The method accomplished its objective, which was to prepare a species list for each site with minimum estimates of abundance for all species. Field workers initially reported some difficulty in orienting themselves in the field, particularly on some of the larger tracts, but with experience these problems resolved themselves. The projected schedule of 2-3 sites/day proved feasible, although time of day analysis (see below) would support restricting survey to just 2 sites/day so that survey work could be completed earlier in the morning.

Date and time of day

Survey work was originally scheduled to run from 16 May through 1 July, but was extended until 6 July in order to complete all sites. Surveys were conducted between 0530 and 1100.

EVALUATION: Date and time of day were evaluated to determine their effects on the likelihood of obtaining a record on a site. This was done using data for Upland sandpipers from Lac Qui Parle, Big Stone, Wilkin, and Clay counties to compare the distribution of these two factors for sites that yielded records and sites that did not yield records. Date did not appear to affect the likelihood of obtaining a record, although no records were obtained on the small number of sites that were done in July. Sites surveyed between 0600 and 0700 appeared to be more likely to yield records than sites surveyed later in the day (Table 9), but this difference did not prove to be statistically significant.

Revisiting sites

To accomplish the goal of acquiring records for listed species that could be entered into the Natural Heritage database, a list of criteria was drawn up to clarify the nature of observations that would constitute acceptable records (see work plan for original criteria). In general, database records in the past had been based on acquiring some evidence of breeding. On sites where a listed species was observed, but where no evidence of breeding was obtained, the observers were encouraged to return to the site outside of regular survey hours to try to get better information on the status of the species on the site. The intention to revisit was noted at the top of the survey form. The date of the revisit, if done, was noted on the log sheet for the county. If a listed species was observed on the revisit, an incidental observation form was to be filled out and attached to the original survey form.

EVALUATION: There were several problems with this plan. First, because of time limitations, only 7 sites were revisited. Second, some mechanism needs to be devised so that the results of all revisits, not just revisits that yielded records, are well documented. This could be done by simply attaching a sheet to the original survey form noting the date and time of revisit, and noting that no listed species were observed. Third, only 3 of 7 revisits resulted in better information about the status of listed species. Fourth, the interpretation of negative information acquired on revisits is equivocal (i.e. time of day alone might explain why no observations were made). Finally, the need for revisits has been lessened by the decision to create a new category of records in the Natural Heritage database called "breeding season observations". Observations of a listed species during the breeding season where no concrete evidence of breeding was obtained can now be entered, and therefore these data are not lost, as they would have been with the old system. The experience of field workers has also resulted in a few modifications of the original criteria for inclusion in the database (Appendix 2).

In summary, based on the limited success of revisits in providing better information on breeding status and questions about time of day effects, revisiting sites should remain a low priority, or even be eliminated.

Instructions

I provided the field workers with a detailed set of instructions that described the survey method and how to fill out the data sheets (Appendix 3). Field workers were asked to send forms from surveys done in the first week to me as soon as possible. These were then reviewed so that any problems could be corrected immediately. Volunteers were provided with the same set of instructions with relevant portions highlighted.

EVALUATION: The instructions were adequate for the professionals, but there was some initial confusion that might have been avoided if I had gone into the field with the field workers and either practiced the method, or accompanied them on actual surveys. Given that this was not feasible, the early review of the first week's work effectively corrected the few problems that arose. For the volunteers, a simplified one page explanation that emphasized the important points (i.e. putting the path and observations on the section map, using the observation codes shown on the data sheet) might have been more effective.

Data recording

1. Survey data sheet: Survey data were recorded on a sheet on which 52 of the species most likely to be encountered had already been typed (Appendix 4). Observations were recorded using a set of 12 categories which provided information about the nature of the observation.

EVALUATION: The data sheets worked quite well. It would be helpful if the comments section, which was located on the reverse side of the data sheet, be placed at the bottom of the first side, or at least that a few lines be available on the first side for this purpose. In many cases, observers wrote comments at the bottom of the first side anyway.

2. Section maps: Observers mapped their route on a large scale map of the section in which the site was located. These were photocopies of ASCS low-altitude photographs. It was intended that observations of listed species would also be mapped on these section maps.

EVALUATION: The mapping was a good idea, but it should be stressed to the field workers that the mapping be done in the field to assure that the path drawn on the map is as close to the path actually walked as possible. Also, it was not always possible to place an unseen singing bird, such as an Upland sandpiper, with precision on the map, but this is unavoidable. Mary Miller has told me that it has been very helpful to her in mapping the records to have the section map showing the part of the section surveyed and the approximate location of records.

3. Incidental observation form: The incidental observation form was intended for use when sites were revisited, and when listed species were observed while field workers were travelling around the county outside of regular survey time (Appendix 5). Arlene Rothstein also coded her incidental observations with numbers, and used these numbers to indicate their locations on a county map. This was very helpful; in the future, an entry labelled "map code number" should be added at the top of the incidental observation form.

EVALUATION: The incidental observation form worked well when it was used. Field workers need to be strongly encouraged to follow this procedure for recording incidental observations. In some cases, incidental observations were recorded only on a county map. It was then necessary to

discuss each of these individually with the observer to obtain the information that should have been recorded on the incidental observation form.

4. Element Occurrence computer forms: Field workers were provided with these forms and instructions for filling them out. Arlene Rothstein filled out forms for most of the records she obtained.

EVALUATION: Mary Miller feels that this practice has little value. Having the field person fill out the computer forms does not save time in her opinion, because each entry must be carefully checked by Mary anyway, and a significant number of corrections have been necessary for the records she has entered so far.

5. Log sheet: For each county a log sheet was prepared that showed all the sites to be surveyed, listed in the order of their County Biological Survey site numbers (originals attached). For each site, the location, size, and legal description of the portion of the site to be surveyed were given. Blank columns were left for the observers to enter survey and revisit dates.

EVALUATION: The log sheet proved to be an effective way of organizing information about the survey sites. I used it to tabulate area surveyed and records obtained by adding additional columns.

Use of volunteers

Fourteen members of the Minnesota Ornithologists' Union were suggested by Bob Janssen as possible volunteers to help with field work. These people were contacted and offered compensation for travel to the western counties in return for their participation in the survey work. Five people agreed to survey a total of 21 sites; however, only 13 sites were eventually completed by 4 volunteers: Carol Hegre, Nestor Heimenz, Bill Litkey, and Mark Stensaas.

EVALUATION: I did not keep track of the time I spent on volunteer coordination, but a conservative estimate would be 6 hours per volunteer, or a total of 30 hours ($375). About $450 was paid to volunteers to compensate them for mileage driven in completing the survey work, making the estimated cost of volunteer work $825. If the sites surveyed by volunteers had instead been surveyed by the full-time field workers, it would have taken 20 to 26 hours of their time. This represents $200 to $260 in additional salary. Survey work by volunteers was clearly not a cost-effective way to get the job done. Also, some volunteers proved undependable: two surveyed less sites than they had agreed to, and one has failed to return the completed survey materials. To determine the value of using volunteers in future survey work, the public relations benefits of volunteer contribution must be weighed against the actual cost of such participation. One way to reduce mileage expenses would be to only assign volunteers to sites near their own home counties; however, a larger pool of volunteers from a broader geographic range would have to be recruited to make this possible.

II. WASHINGTON COUNTY

GOALS

The goals of survey work in Washington county were to: 1) determine the distribution of Red-shouldered hawks and Louisiana waterthrushes on County Biological Survey sites that appeared to possess suitable habitat, 2) prepare species lists for several sites requested by John Almendinger, and 3) survey several sites for Henslow's sparrows.

AMOUNT OF FIELD WORK COMPLETED

Thirty-seven sites were surveyed in Washington county by various methods (Table 10). This required 14 person days, which were evenly divided between Bruce Fall and Bonita Eliason. The two species targeted by most of the survey work were Red-shouldered hawk and Louisiana Waterthrush.

SUMMARY OF RECORDS OBTAINED

There were initially no records for either of the targeted species in the Natural Heritage database for Washington county. Twelve pairs of Red-shouldered hawks and 12 Louisiana Waterthrush territories were located during the survey work. Several of the Waterthrush territories were contiguous within the same quarter section; the total number of records entered in the database for this species was therefore 7. One Henslow's sparrow was reported from Afton State Park, but could not be relocated by Bruce Fall. An American bittern was observed by John Moriarty during the course of the herp survey work.

SITES WHERE SPECIES LISTS WERE DONE

John Almendinger requested species lists from 5 sites of special interest to him (sites 5, 39, 40, 42, 182). I am including in this discussion site 58, and site 118, on which several noteworthy species were observed. Species lists were also done on sites 96, 98, and 204, where the primary objective was to do playback for Louisiana waterthrushes; I will not discuss these here because no other noteworthy species were observed on them. Species lists for all of these sites can be found in Appendix 6.

Site 5: Lost Valley Prairie

This site was surveyed for Henslow's sparrows, and to compile a species list that could be included with other inventory information for this unique site. Bruce Fall noted that "the dominant birds were those characteristic of deciduous brush/thickets and shrubby prairie rather than grasslands". This predominance of woody vegetation may explain why no Henslow's sparrows were observed there (Zimmerman 1988). The most interesting bird observed was a Yellow-breasted chat, a species that is considered casual in the southeastern and southwestern parts of the state in summer. The habitat was judged by Bruce to be excellent for the species, although the individual he observed did not appear to be actively territorial. Additional visits would be required to determine the status of this species on the site.

Sites 39, 40, and 42: Grey Cloud Dunes

These are dry prairies with vegetation too sparse to be preferred by Henslow's sparrows. The most interesting species observed on these sites was the Orchard oriole (2 pairs and a nest). There are no recent nesting records for this species from Washington county, which is on the northern edge of this species' range in the state (Janssen 1987).

Site 182: Cedar Bend White Pines

This was one of the most interesting sites surveyed in terms of birds. In addition to a territorial Louisiana waterthrush, a singing Winter wren and several singing Cerulean warblers were observed. Winter wrens are found in coniferous forests in the northeastern and northcentral regions of the state; Washington county was not considered to be part of this species' breeding range by Janssen (1987). Cerulean warblers are breeding birds of the Mississippi and Minnesota River valleys in Minnesota, and although Washington county was included in their range by Janssen (1987), there are no recent nesting records for the county. The site contains components of both northern coniferous forest and southern deciduous forest communities, which would explain the presence of such unlikely neighbors as Winter wrens and Cerulean warblers.

Site 58: Afton 22

This site was surveyed because it appeared to provide suitable habitat for both Louisiana waterthrushes and Red-shouldered hawks, and because an adult Bald eagle was observed on the site by John Almendinger. The vegetation is similar to that found on site 182, although white pines are much less common. Louisiana waterthrushes were observed; the raptors were not, although Bruce Fall noted that the site seemed suitable for Red-shouldered hawks. Two other species of interest were observed here: a pair of Mourning warblers and a singing male Winter wren. If these species are breeding on the site (and it seems likely, according to Bruce), this would represent the southernmost breeding spot in the state for both species.

Site 118: Grant 14

This site was surveyed because it was considered to be potential Red-shouldered hawk habitat. Although none were observed on either of two visits there, Bruce Fall noted that the habitat appeared suitable. Bruce did find a Prothonotary warbler nest at the edge of a wooded lake, an unusual habitat for this species in Minnesota, where they are known to breed only along rivers in the southeast and eastcentral regions (Janssen 1987). The only other species of note was a singing Mourning warbler. As noted above, breeding has not been documented for this species in southern Washington county.

EVALUATION OF METHODS

Site selection

Survey work was mainly limited to sites that possessed potentially suitable habitat for the two target species, with the exception of 4 of the 5 sites discussed above. The habitat requirements of Louisiana waterthrushes are quite specific, so it was relatively easy to identify appropriate habitat for this species (see discussion below under status of that species). Red-shouldered hawks are known to prefer floodplain forests in Iowa, but also occur in mixed deciduous woodlands with scattered ponds and marshes in other

parts of their range. Studies in Iowa had also demonstrated that the species required about 200 hectares of woodland (Bednarz and Dinsmore 1982). This led to a focus on fairly large pieces of woodland. Since much of the best habitat for both species occurs in a strip along the St. Croix and Mississippi Rivers, and since a method has been described for surveying Red-shouldered hawks by road transects (Mosher 1987), I decided that playback from road and river would allow the maximum amount of suitable habitat to be surveyed.

EVALUATION: John did an excellent job of pinpointing suitable sites based on the descriptions I gave him.

Survey methods

1. General: The survey method used in the western counties was not appropriate for the species of interest in Washington county (Red-shouldered hawk, Louisiana waterthrush, Common moorhen, American bittern, and Henslow's sparrow), each of which poses unique survey problems. Habitat preferences by Henslow's sparrows are very poorly understood, making it difficult to design a cost-effective survey method. Also, Lynelle Hanson is already working on this species in the state. Efforts to locate this species were to be restricted to surveying a small number of sites that had already been identified as having valuable natural communities. Common moorhens and American bitterns occur in wetlands, and wetland communities have largely been excluded from County Biological Survey efforts. Bob Holtz was to do a study on American bitterns in Washington county (funded by Non-game small grants money) that proposed to try out a potential survey method, as well as collect information on the occurrence of American bitterns on several CBS sites in the county.

I therefore decided to focus my survey efforts on Red-shouldered hawk and Louisiana waterthrush, because both use habitat that was already represented on County Biological survey sites identified by John Almendinger, and I was confident that good information on their distribution in the county could be obtained (in a cost-effective manner) by focussing on those sites.

2. Red-shouldered hawk: Initially this species was sought using playback of Great horned owl vocalizations at stops along roads and rivers. On the third field day, when Great horned owl vocalizations were having poor results, we tried playback using Red-shouldered hawk vocalizations with much better results. We subsequently used both tapes, but relied most heavily on the Red-shouldered hawk tape, which frequently led to both approach and vocalizing by one or both adults.

My original plan was to stop every 0.5 mile in suitable habitat and do a playback. This plan was subsequently modified as follows. For most sites surveyed from the road there was not good road access at standardized intervals. We therefore chose playback stops based on the proximity of the road to appropriate habitat. For most sites this resulted in only one playback stop per site. For the portion of the St. Croix surveyed from canoe, we did not attempt to stop the canoe to do playbacks, but rather began playbacks about every 0.5 miles where the habitat looked suitable, and drifted downstream while we continued the playback for 5-8 minutes. For the portion of the St. Croix surveyed from pontoon, we did playback at approximately 0.5 mile intervals, but did additional playback opposite CBS sites that were located along the shore, even if these sites were less than 0.5 miles apart. For the portion surveyed by motorboat, playback was done at approximately 0.5 mile intervals where potential habitat occurred.

Survey work was done throughout the month of June, between 0530 and 1600..

EVALUATION: 1) Road surveys: The effectiveness of road surveys was hampered by the absence of roads passing through or immediately adjacent to some of the tracts. Two of these were initially surveyed from roads on the periphery with no results; whereas hawks were later located when the sites were entered on foot (sites 134 and 135). In counties with more extensive forest to which there is good access via logging or other roads, the driving-playback method might yield much more consistent results.

2) Water surveys: Playback from a boat worked best when a canoe was used. Use of a motor boat or pontoon, while it allows more territory to be covered, makes close approach to shore difficult. Also, playback from a canoe can easily be done while drifting or paddling, thus maximizing area covered, but the sound of the motor seems to drown out the playback, making it ineffective when the boat is moving.

Considering the amount of time involved in making the pontoon trip on the southern part of the St. Croix (11 hours), the poor return (1 pair of hawks located), and my suspicion that the motor noise was drowning out the playback, it might have been
more effective to have spent the time visiting a sample of sites along that portion of the river on foot.

3) Date and time of day: Other demands on my time prevented me from beginning the Red-shouldered hawk survey until June. It would almost certainly be easier to locate these birds when they are setting up territories in early April. At this time there is much more spontaneous vocalizing, so there would be less need to rely on response to playback to locate pairs.

There was no indication that time of day was important in eliciting response to playback. In fact, early morning is probably less preferable than late morning or afternoon for hawk survey work, since birds are more likely to be spotted while soaring during the warmer parts of the day.

I would make the following recommendations for future Red-shouldered hawk survey work:

1) Both conspecific and Great horned owl tapes should be used, with a greater reliance on the former.
2) This season it was not possible to visit most sites more than twice. It would be preferable, if time permitted, to do playbacks three or more times, especially where no results were obtained on the first attempts.
3) For sites with poor road access, a combination of survey methods such as driving and walking is recommended when possible.
4) Water surveys should be done from a canoe, rather than a motorized boat, whenever possible.
5) An effort should be made to get information from selected MOU people on sightings for species of interest. Although Bob Holtz had little success with efforts to get information in this way about American bitterns, I learned of 4 Red-shouldered hawks and 1 Louisiana waterthrush by talking with birdwatchers familiar with the county (Dick Oehlenschlager and Jim Fitzpatrick).

3. Louisiana waterthrush: Playback of conspecific vocalization was done in habitat judged to be suitable. Permanent streams in steep ravines were visited on foot and playback was done while walking upstream until a

bird responded, and continued at intervals of 20-30 m to determine approximate territory size. In this habitat, territories appeared to extend approximately 200 m along the stream. In cases where there appeared to be sufficient habitat for more than one pair of birds (i.e. greater than 200 m of suitable stream valley), playback was continued upstream of the first pair in an attempt to locate additional pairs. During the canoe trip of the upper St. Croix described above under Red-shouldered hawk, Louisiana waterthrushes where located by listening for singing males, as well as by playback where streams entered the river. At permanent streams, we landed and did playback for at least the first 100 m.

Survey work was done in the first 3 weeks of June, usually from 0530 to 1100, but occasionally as late as 1600.

EVALUATION: Playback worked very well with this species. In all cases when playback was done in suitable habitat, one or both members of the pair responded vigorously by approaching, chipping and/or singing, and flying agitatedly back and forth. This was true even in the afternoon, and when the male was not singing when playback was initiated. Several pairs were also located by listening for singing males while drifting along the St. Croix in a canoe in the early morning.

The first three weeks of June were a good time to do this type of survey. Probably late May would also be suitable. If males are to be located from singing alone, early morning surveys are definitely preferable; with playback, afternoon surveys are also acceptable.

Forms

No special forms were used for the survey work. Field observations were recorded on a topographic map, and described in field notes. Observations that constituted records were recorded on the same Incidental Observation forms used in the western counties, with xerox copies of portions of topo maps attached to show the exact locations of individuals.

EVALUATION: This method worked well. If extensive road or boat survey work was undertaken, a special field form designed for this purpose would be useful.

III. Species accounts: a summary for each of 18 targeted species of distribution in the state, database records, habitat preferences, status in the 1988 CBS counties, and recommendations for future work in those counties.

Species are organized as they are in Tables 5 and 6, with species receiving primary emphasis in 1988 survey work listed first, followed by two groups of species that received less emphasis.

Red-shouldered Hawk (Buteo lineatus)

Minnesota status: Special concern

Distribution in Minnesota: This hawk was uncommon during Roberts' time, but probably bred in the southeastern part of the state (Roberts 1932). It is now expanding its range from the southeast and east-central regions northwestward to central and northcentral regions (Janssen 1987).

Database records: There were no records from the 7 current CBS counties. Twelve pairs of hawks were located in Washington county during 1988 survey efforts. Ten of these records were considered to be inferred breeding, one was positive nesting, and one was a breeding season observation.

Habitat: Bednarz and Dinsmore (1982) compared the habitat requirements of Red-shouldered hawks and Red-tailed hawks and concluded the following: 1) Red-shouldered hawks nest in extensive tracts of mature floodplain forest with numerous small open hunting areas such as marshy clearings and wet meadows; 2) they require a minimum of 123 ha of floodplain and 70 ha of adjacent upland forest; and 3) compared to Red-tailed hawks, Red-shoulders prefer larger tracts, more canopy trees, greater tree densities. In Minnesota they are also known to occur in mixed deciduous woods with streams or ponds (pers.obs).

Mature floodplain forest and mixed oak woods with openings created by ponds or marshes were targeted in Washington county as sites where playback would be done, and Red-shouldered hawks were found in both types of habitat. Along the St. Croix river in the northern part of the county 4 pairs of hawks were observed along about 7.5 miles of river. In this area they were seen on wooded slopes of mixed oak (with white pines in some areas), with or without adjacent floodplain forest. Elsewhere in the county they were found in tracts of mixed oak woods with scattered marshes and ponds, occasionally with adjacent conifer swamps. Most targeted areas had fairly extensive areas of potential habitat (i.e., at least 160 acres); two had only 60 to 80 acres of suitable habitat.

One nest site, near the town of Lake Elmo, and located between Lake Jane and Lake Demontreville, was in the middle of a suburban housing development. Two nearly full-grown young were present at the nest-site when I visited it. The tree in which the nest was located was directly adjacent to a paved street, and within 20 m of a suburban residence. Another pair was observed at the west end of Square Lake, in an area containing many cottages and homes. From this I conclude that at least some Red-shouldered hawks are able to breed successfully in close proximity to people.

It is difficult to know how to interpret negative evidence, especially since no site was visited more than twice, and most were visited only once. Failure to detect hawks may have been caused by inadequate survey. Certainly there were some sites that appeared to provide suitable habitat, but on which no hawks were observed. Assuming for a moment that failure to detect hawks meant there were none present, plausible explanations come to mind for absence from some sites, but not for all. Size might explain why no evidence

of breeding Red-shoulders was found on the 2 sites with the least suitable habitat (#137, 193), but others such as #118, and #140-141, seemed very suitable in both habitat and size. Red-tailed hawks were observed on both visits to sites 140 and 141, so it is possible that a competitive interaction between the two species prevents Red-shoulders from breeding there. Red-shoulders had been reported in previous years from site 61, but none were found in 1988, in spite of extensive road survey attempts. Afton State Park (sites 17 and 25) has a great deal of apparently suitable habitat, but no Red-shoulders were found there, nor have they been observed there on numerous spring visits over the last 5 years (pers.obs.).

Status in Washington county: Given the limitations of the survey method, only a tentative assessment of the status of Red-shouldered hawks in Washington county is possible. In the northern half of the county, where I felt the most appropriate survey methods were employed, Red-shoulders were found on 9 of 16 sites on which they were sought. These sites are typical of the relatively undeveloped Red-shouldered hawk habitat in the northern half of the county, and the species was demonstrated to be present on more than half of them. In addition, there is a great deal of developed woodland around lakes in the northern part of the county that is not represented in County Biological Survey sites, but that may well provide suitable habitat for the species (as illustrated by the nest near Lake Elmo). I therefore feel that our 1988 survey efforts have demonstrated that the species is doing quite well in northern Washington county.

In the south half of the county, where the majority of sites were surveyed from a motorboat or pontoon, the species was found on only 1 of 11 sites surveyed. Most of the suitable habitat in this part of the county is floodplain forest, and I do not feel that we adequately sampled it, so generalizations about the status of Red-shouldered hawks in the southern part of the county would be unwise.

Future work on the species in Washington county: Other sites that appear to contain suitable habitat, but that were not surveyed in 1988, would be 147, 150, 151, and 162-165. To address the question of the minimum size of habitat required, a number of smaller sites such as 126, 131, 171, and 175 (also not surveyed in 1988) could be surveyed. The portion of the river between Marine-on-St. Croix and Stillwater would probably be worth sampling from canoe as was done for the area north of Marine. Finally, the floodplain forests in the southern part of the county could be resurveyed in a more leisurely manner, using both Red-shouldered hawk and Great horned owl tapes.

Yellow Rail (Coturnicops noveboracensis)

Minnesota status: Special concern

Distribution in Minnesota: The distribution of this species has never been well-known because of its secretive habits, and preference for habitat inhospitable to bird watchers. Roberts (1932) was certain that it occurred in the western part of the state, but felt it may have occurred throughout the state in appropriate habitat. Its current range is believed to be from Wilkin county north and east to Aitkin county (Janssen 1987).

Database records: There is one record from Anna Gronseth prairie (site 44) in Wilkin county. The species was not observed during the 1988 field season, even though portions of site 44 where it had previously been observed were surveyed. Twelve other sites were surveyed that had contained potentially suitable habitat in former years (R. Dana, pers. comm.) The severe drought caused most wet meadows, including those on Anna Gronseth, to become totally dry.

Habitat: The species has been found to occur in a variety of habitats including mixed sedge and bulrush marshes, small boggy areas with grassy hummocks, and monotypic stands of Carex lasiocarpa (studies cited in Hanowski and Niemi 1986). Water depths may range from just moist to maximums of 46 cm (Stenzel 1983). In Michigan, Yellow rails are associated with Sedge wrens, LeConte's sparrows, and Bobolinks (Stenzel 1983); in Minnesota with Sharp-tailed and LeConte's Sparrows (Eckert 1983). In Michigan the mean territory size was 8.3 ha, with a maximum density of 1/5 ha (Stenzel 1983).

Status in the 6 western CBS counties: This species was ranked among the first priority species because there is a great deal of interest in its status, and the survey method was considered appropriate for detecting it. The drought undoubtedly had a serious impact on the preferred habitat of this species, so the failure to observe the species in 1988 cannot be extrapolated to other years. No assessment of its status in the target counties is possible.

Future work on the species in these counties: I think the survey method was appropriate for this species, but the best results could probably be obtained from a study focussing on just Yellow rails and Sharp-tailed sparrows. Sites surveyed in 1988 that were judged to contain suitable habitat for these species would be a good starting point, and others could undoubtedly be included if the precondition of high quality prairie was removed. Surveys should be done at a time of day (dusk) when both species are more likely to be vocalizing.

Upland Sandpiper (Bartramia longicauda)

Minnesota status: Special concern

Distribution in Minnesota: The species was once "exceedingly abundant" on western prairies and occurred in sparsely wooded areas throughout the state (Roberts 1932). Between 1870 and 1900 its numbers were severely reduced in the southwestern region of the state due to extensive market hunting and habitat destruction from cultivation of the prairies. With the end of legal hunting in 1916, numbers began to increase again, but continuing habitat loss has been blamed for a renewed decline since 1920 (Coffin and Pfannmuller 1988). Upland sandpipers still occur in most of the state, except the northeastern part, but the species is most numerous in west and south-central regions.

Database records: There were 17 records in the database, from all western CBS counties except Traverse. In 1988, 96 additional records were obtained, including a new county record from Traverse, where the species was found on 2 of 10 sites surveyed.

Habitat: The species is said to prefer mixed and tall grass prairie, but also occurs on wet meadows, hayfields, and occasionally on croplands (Johnsgard 1979). Vegetation structure has been shown to be important in habitat selection. Studies of nesting habitat in North Dakota have found that nearly all nests occur in vegetation 13-64 cm high with 62% of nests occurring in 16-31 cm vegetation (Kirsch and Higgins 1976). In South Dakota, vegetation taller than 60 cm was not used (Kaiser 1979). Also in North Dakota, densities were highest on native tracts managed by periodic burning, but moderate grazing (i.e. removal of 20-40% of current year's growth) was also acceptable. In Minnesota, the species uses fairly short, not too dense tracts that are created by mowing, burning or grazing (Coffin and Pfannmuller 1988).

Status in the 6 western CBS counties:

Overall summary: Upland sandpipers were more commonly observed than any other of the targeted species, representing 75% of the bird element occurrences observed in the western counties in 1988. Across all 6 counties, this species was found on about 50% (65 of 130) of the sites judged in advance to contain suitable habitat (range 28% to 76% for the 6 counties) (Table 11). They were also observed on an additional 13 sites where they were not specifically anticipated, for a total of 43% of all sites surveyed.

Rough estimates of density can be made by dividing minimum estimates of number of pairs per site by the sum of acreage surveyed on all sites. These values ranged from 0.2 pairs/100 acres in Traverse county to 1.1 pairs/100 acres in Wilkin county, with a mean of 0.6 pairs/100 acres for all 6 counties. These values are not strictly comparable to density values found in the literature, because literature values are based on intensive nest searching in different habitat types, rather than the type of survey work done in this study. Kaiser (1979) found 1.7 nests/100 acres on native prairie in South Dakota. Mean nesting densities in North Dakota ranged from 0.4 to 3.3/100 acres; the highest densities being on native grasslands managed by prescribed burning (Kirsch and Higgins 1976).

Drought conditions in 1988 may have favored this species, but I am hard pressed to explain how the data illustrate this. One might have predicted that in the wetter prairie regions of Wilkin and Norman counties, drought

conditions would produce a more suitable vegetation profile for the species. However, these counties had among the lowest frequency of occurrence for the species. Several North Dakota ornithologists reported their subjective impressions of higher numbers of Upland sandpipers this year in that state than usual (M. Colwell, pers. comm.). Without good information on the effect of drought on the distribution and abundance of Upland sandpipers, caution should be exercised in using the results of one (possibly atypical) season of data to reassess the species' status in Minnesota.

One question that needs to be addressed is why there was not a better match between sites where the species was expected and sites where the species was observed. There are several possible explanations for this. 1) Individuals were present but not detected. This may explain some of the discrepancy, but is easier to discount for this species than for some others. Upland sandpipers tend to be quite conspicuous, since even non-breeding birds fly up and vocalize when disturbed, so it seems likely that in most cases where they were not observed, they were not present. 2) Assessments of suitability were imprecise. There are at least two reasons to think this is so: because suitability decisions were based on qualitative assessments rather than measurement of habitat variables, and because botanists visited the sites one to several years ago and changes in land use on the site since the original field work was done might have altered the suitability. 3) Suitable habitat is unoccupied because of low population levels. There is no basis for concluding this; precise measurements of habitat variables would be a prerequisite.

These factors notwithstanding, the occurrence of Upland sandpipers on almost half of the sites surveyed suggests that they were not rare on high quality native grasslands in western Minnesota in 1988. The species also occurs on other types of sites as well, as indicated by observations of 13 additional individuals recorded by field workers while travelling around in the survey counties. There is reason to believe, however, that the sites surveyed may provide some of the most important habitat for Upland sandpipers in these counties. Several studies elsewhere have shown that native grassland provides the best nesting habitat for the species, both because it supports the highest densities of nesting pairs, and because nesting success is higher there (Kaiser 1979, Kirsch and Higgins 1976).

Management of the best quality sites by prescribed burning every 3 years, as recommended by Kirsch and Higgins (1976) should help to assure that suitable habitat for this species is maintained.

County by county summaries

Norman: Upland sandpipers were observed on 33% of sites where they were expected (6 of 18), plus 2 additional sites, for a total of 38% of all sites surveyed. All but one of the observations were in Lake Ida and Rockwell twps, with none in Home Lake, although there were a cluster of survey sites (dry hill prairies) there. The density of Upland sandpipers in Norman county was the second highest, at 1.0 pair/100 acres.

Clay: Upland sandpipers were observed on about half of the sites where they were expected (13 of 25), and 38% of all sites surveyed in the county. Observations were evenly distributed between the Felton and Bluestem areas; no Upland sandpipers were observed on sites in the southeastern part of the county. These sites are mostly dry hill prairies. The density of Upland sandpipers in Clay county was 0.5 pair/100 acres.

Wilkin: Upland sandpipers were found on only 28% (7 of 25) of sites where they were anticipated. These represented 20% of the sites surveyed. Possible explanations are that prairies are too wet and vegetation too tall for this species in much of the native grassland in the area. Wilkin county had the second lowest density of this species: 0.3 pair/100 acres.

Traverse: Upland sandpipers were observed on 2 of 10 sites surveyed; only one of these was a hill prairie. The other was the 60 acre Miller Prairie east in the east-central part of the county. Hilly terrain and heavy grazing may be factors in the absence of Upland sandpipers from other sites. The density of Upland sandpipers was lowest in Traverse county at 0.2 pair/100 acres.

Big Stone county: Big Stone county had the highest "success" rate for Upland sandpipers; they were found on 76% (22 of 29) of sites where they were anticipated, plus 3 additional sites. These represented 66% of the 38 sites surveyed. The high success was surprising because, in contrast to the other 5 western counties, few sites in Big Stone had been ground checked by botanists. Site selection was based largely on air photo interpretation. Upland sandpipers observations were scattered throughout the total survey area. Big Stone county also had the highest density of Upland sandpipers: 1.1 pairs/100 acres.

Lac Qui Parle county: Upland sandpipers were found on 65% (15 of 23) of sites judged in advance to be suitable, and on an additional 8 sites where they were not specifically anticipated. These represented 38% of the 40 sites surveyed. Upland sandpipers were scattered throughout all areas of the county surveyed. The group of sites in southern Hantho twp (southwest of Lac Qui Parle lake) had the highest proportion of sites with Upland sandpipers, which were observed on all 7 of the sites. The density of Upland sandpipers was 0.7 pair/100 acres surveyed.

Future work on the species in these counties: Two types of data would be needed to more accurately evaluate the status of Upland sandpipers in these counties. One is long term data on occurrence collected annually. This could be collected on a sample of selected high quality sites, with each site surveyed one to several times/year. The second type of data is information on reproductive success. Collection of such information usually involves marking individuals, searching for nests, and following them throughout the season to determine outcomes. Ideally, one would want comparative information from all habitats used by the species, but the highest priority would again be the high quality prairies because these are the sites where acquisition and management are most feasible.

Marbled Godwit (Limosa fedoa)

Minnesota status: Special concern

Distribution in Minnesota: Historically (pre-1880) Marbled godwits nested throughout the prairie regions of west-central Minnesota and the Red River Valley. The species declined in abundance mirroring the decline of Upland sandpipers from 1880 until the late 1920's, and presumably for the same reasons. Again like Upland sandpipers, their numbers increased again so that by Roberts' time Marbled godwits were common in Grant and adjacent counties (Roberts 1932). The current range of the species in Minnesota is from northern Lac Qui Parle county north to Kittson, east to the western edge of the second tier of counties (Janssen 1987).

Database records: There were 10 records in the database, at least one from each of the 6 western CBS counties. Clay had the largest number, with 4 records. In 1988, 38 additional records were obtained from all but Traverse county. The largest number were again in Clay, where 14 observations were made.

Habitat: The species has been intensively studied in North Dakota, where nests were found to occur in equal proportions in pastures, hayfields and grasslands with vegetation less than 15 cm tall (Ryan et al. 1984). Croplands are generally avoided, but some nests have been found in small grain and stubble fields. An analysis of used versus unused sites by Ryan et. al (1984) showed that territories included more alkali, semipermanent and ephemeral wetlands than did randomly selected non-used areas (on average 4.9 wetlands on a 0.9 km^2 territory). It has also been observed that the species tends to be associated with large expanses of suitable habitat (Coffin and Pfannmuller 1988), although Ryan (pers. comm.) has found no evidence to support this idea.

Status in the 6 western CBS counties:

Overall summary: Marbled godwits were the second most commonly observed of the targeted species; the 38 observations represent 25% of bird element occurrences in the western counties in 1988. Across all 6 counties, this species was found on 19 of 91 sites (21%) judged in advance to contain suitable habitat (range 0 to 35% for the 6 counties)(Table 12). They were also observed on an additional 7 sites where they were not specifically anticipated, for a total of 14% of all sites surveyed.

When density estimates are made in the same way as for Upland sandpiper, densities ranged from 0.08 to 0.34/100 acres in the 5 counties in which they were found (X=0.17). These values are similar to densities calculated by Ryan et al. (1984) during 2 drought years in North Dakota (0.08 pairs/100 acres).

The largest number of records was obtained in Clay county where 13 pairs were observed on 11 sites. In both Clay and Big Stone counties densities were comparable to those found by Ryan et al. (1984) in North Dakota in a year of greater than average precipitation. In fact, the density figures for Big Stone are misleadingly low, since all godwit sightings were made in a fairly restricted area in the southwestern part of the county. If only sites in this area were used in the density calculations, the value would be much higher. Numbers were relatively low in Wilkin and Norman counties, but Wilkin observations are somewhat unusual in that godwits were observed flying over during the survey on a relatively large number of sites (11) relative to the number of records obtained. (Fly-overs were noted on survey sheets,

but not included in the database because of difficulty interpreting their relationship to breeding status). The number of fly-overs in Wilkin was equal to that of Clay, where more than twice as many records were obtained. In contrast, no fly-overs by this species were observed in Big Stone, Traverse, or Norman counties, and only one fly-over was observed in Lac Qui Parle county.

There are a number of possible explanations for the large number of fly-overs: 1) They represented non-breeding birds (perhaps prevented from breeding by a decrease in suitable habitat caused by the drought). 2) They represented breeding birds flying to distant feeding areas. This also might have been accentuated by the drought if birds were forced to fly farther to find suitable feeding areas. 3) These may have been breeding birds from sites that were adjacent to surveyed sites. 4) They may have been failed breeders. Since Wilkin was surveyed after Clay, there may have been a larger proportion of birds in this category in Wilkin than in Clay at the time of survey. It is not possible to sort out these explanation based on the data we have. Regardless of the reason for these large numbers of fly-overs, they at least indicate that godwits were more common in Wilkin county than the survey data would indicate.

It is easier to see how drought conditions might affect Marbled godwits since their feeding is more tied to wetlands than is that of Upland sandpiper. The study done by Ryan et al. (1984) spanned one year of normal precipitation and 2 subsequent years of drought. Densities of both temporary wetlands and godwits were significantly lower in the drought years.

Success at predicting where Marbled godwits might occur was lower than for Upland sandpiper, but some of the same explanations might apply to the discrepancy. 1) Individuals were present but not detected. This is somewhat more likely to be a problem with this species, especially during the incubation period. Although the birds are large and conspicuous, incubating birds sit very tight, and if the feeding area was distant from the nesting territory, an observer might pass very near an incubating bird whose mate was off feeding, and both birds could go undetected. During the brood rearing period, mobbing behavior is much more vigorous and predictable (Ryan pers. comm.) 2) Assessments of suitability were imprecise. Like Upland sandpipers, Marbled godwits show distinct preferences for vegetation of a certain structure. Errors in perception or changes in site use might both contribute to a poor match between predicted and observed sites. In retrospect, I perhaps should have stressed proximity to wetland types listed above as a criterion for site selection, rather than vegetation structure alone. 3) Suitable habitat is unoccupied because of low population levels. Again, there is no basis for concluding this; precise measurement of habitat variables would be a prerequisite.

Based on the results of the 1988 field season, godwits were rarer in the 6 counties than were Upland sandpipers. This may be in part because their requirements for large numbers of shallow wetlands make them more sensitive to drought conditions than are Upland sandpipers, which feed extensively in uplands. The population in southwestern Big Stone county would seem to be particularly vulnerable because they are more localized, and occur on a smaller number of sites.

As with Upland sandpipers, the high quality sites surveyed probably represent the best habitat available for the species in the survey counties, although information on reproductive success in different habitats is not as good for this species as for Upland sandpiper. Ryan et. al (1984) make fairly specific recommendations land management to favor this species on public lands in North Dakota; they would seem to apply equally well to

Minnesota. To briefly summarize, haying, grazing, fall burning or mowing can all be used in areas with sufficient numbers of preferred wetland types to attain the vegetation profiles preferred by Marbled godwits (Ryan et al. 1984).

County by county summaries

Norman: Marbled godwits were observed on only 1 of 9 sites where they were expected, and on one additional site (10% of sites surveyed in the county). Both birds were on WMA's in the southeastern part of the county. The estimated density based on these observations is 0.14/100 acres.

Clay: The largest number of records was obtained in Clay county, where the species was observed on 35% of the sites where it was anticipated (8 of 23), and an additional 5 sites, or 30% of all sites surveyed. The largest number of records and fly-overs came from the Felton area, with a few in the Bluestem area. Densities in Clay county of 0.34 were also the highest found in the six counties.

Wilkin: Godwits were observed on 14% (3 of 22) of the sites where they were anticipated in advance, all in the northern half of the Rothsay area. The species was also observed on one additional site, for 11% of all sites surveyed. The density of godwits was about the same as that calculated for Norman county (0.13 pairs/100 acres). However, as noted above, large numbers of fly-overs suggest that the density of birds on survey sites underestimated the number of godwits in Wilkin county.

Traverse: No Marbled godwits were observed in Traverse county, even though they had previously been found on Miller Prairie West as recently as 1980. Bruce Harris noted that this site appeared in 1988 to offer ideal cover for both Upland sandpipers and Marbled godwits, but neither were present.

Big Stone: This county had the highest frequency of occurrence (5 of 16 sites), and was second only to Clay in density (0.17) pairs/100 acres). The 5 sites represented 13% of all sites surveyed in the county. As discussed above, these densities would be even higher if only sites from the southwestern part of the county were used in the calculations.

Lac Qui Parle: Marbled godwits were found on 10% of sites judged in advance to be suitable and on 2 additional sites. This represents 10% of sites surveyed in the county. The 4 records all came from sites in the northern part of the county (south of Marsh and Lac Qui Parle lakes, and the Minnesota river). High quality prairie tends to be more fragmented in the southern part of the county, which may explain the absence of godwits there. Alternatively, northern Lac Qui Parle county may be the southern limit of godwit range in Minnesota for other reasons. The density of Marbled godwits was 0.08 pairs/100 acres.

Future work on the species in these counties: Given demonstrated declines in Marbled godwit abundance in drought years (Ryan et al. 1984), the data obtained in 1988 may underestimate the abundance of this species in years of more normal precipitation. To track these fluctuations one would need the same sort of long term monitoring of selected sites suggested above for Upland sandpipers. Acquiring information on reproductive success would also be valuable, and would require the same sort of study described for Upland sandpipers.

Wilson's Phalarope (Phalaropus tricolor)

Minnesota status: Special concern

Distribution in Minnesota: Before 1900, the species was abundant throughout the southern and western parts of the state, with hundreds of nesting pairs noted at Heron Lake in Jackson county by Roberts (1932). It's decline in the late 19th century was sudden. Although by 1920 it had increased again, the species has never fully recovered from the earlier decline (Coffin and Pfannmuller 1988). It is still considered by Johnsgard (1987) to be "fairly common" in western Minnesota. Janssen (1987) shows the range as northwestern and central Minnesota.

Database records: There were 6 records in the database, at least one from each of the western CBS counties except Traverse. In 1988, 11 records were obtained from 4 counties: Norman, Wilkin, Big Stone, and Lac Qui Parle.

Habitat: Nests are found in wet meadows, grassy swales, hummocky areas of shallow marshy habitat, and are associated with "watery environments ranging from ditches to river edges to seasonal, semipermanent, or permanent ponds and lakes" (Johnsgard 1979). Coffin and Pfannmuller (1988) note that "most nests are located in the wet-meadow zone of wetlands or in nearby upland prairie sites. In Saskatchewan, shallow flooded meadows of Hordeum jubatum and Triglochin maritima are preferred for feeding and brood rearing, and nests are usually within 150 m of such wetlands (Colwell and Oring 1988a). Colwell (pers. comm.) also reports a great deal of similarity, both structurally and floristically, between habitat preferences of Wilson's phalaropes and those of Marbled godwits. In Alberta, where the species is often associated with Black or Common Tern colonies, nesting occurs near shallow sloughs with grassy margins or in hay meadows or pastures 50-100 feet from water. Small colonies of 2-8 pairs are common (Hohn 1967).

Status in the 6 western CBS counties:

Overall summary: Wilson's phalaropes were the third most commonly observed of the target species, but with the small number of observations (11), it is more difficult to comment on the species' status, and less fruitful to take a county by county approach. Wilson's phalaropes were observed on 6 of the 43 sites (14%) on which they were considered possible, and on an additional 5 sites where they were not expected, yielding 6% of all sites surveyed.

Once again it is necessary to evaluate the discrepancy between expected and observed, and once again, the same basic considerations apply 1) Detection: phalaropes breeding very close to wetland edges would have had a lower likelihood of detection than would those nesting in adjacent prairie upland because as noted elsewhere, wetlands per se were not included in the surveyed area. 2) Imprecise assessment of suitability: shallow wetlands favored by Wilson's phalaropes were undoubtedly severely impacted by the drought. Colwell and Oring (1988b) observed sharp population declines on their Saskatchewan study area in response to drought (from 50 breeding males in 1982 to 0 in 1984). 3) Suitable habitat unoccupied: this is probably unlikely, because the amount of suitable habitat would have been much lower than usual because of the drought.

Rather than take a county by county approach, I will briefly summarize the distribution of records. Lac Qui Parle yielded the largest number (5); this represented 30% of the sites where they were expected. Unlike Marbled godwits, Wilson's phalaropes were observed in the southwestern portion of the

county on 2 of the sites arrayed along the gravel ridge that runs diagonally across Garfield, Mehurin, and Freeland townships, as well as on 3 sites in the northern part of the county.

Wilkin ranked next in abundance with phalaropes observed on 3 sites, including sites on the northern and southern end of the Rothsay area. Finally, 2 phalarope sightings were made within several miles of one another in Norman county (Freeland township), and 1 was seen in the southeastern corner of Big Stone county.

In conclusion, as was true for the other shorebird species, the numbers of Wilson's phalaropes observed on the high quality prairie in 1988 may not have been typical of numbers present in a more normal year. In addition, I think our data on Wilson's phalarope were not as good as those for Upland sandpipers and Marbled godwits. As indicated above, wetland edges not bordered by high quality prairie would not have been included in the survey, and these are an important nesting area for the species.

Future work on the species in these counties: To determine if the number of observations obtained in the survey counties is truly representative of the abundance of phalaropes there, survey work focussed more specifically on the species would be required. The species is particularly difficult to survey accurately because neither sex is territorial and females roam around looking for mates. A logical approach would be to focus survey efforts on shallow wetlands feeding areas, rather than on the upland nesting areas, but even here there are problems, because early in the season numbers of birds on a given wetland can fluctuate daily, or even hourly (Colwell and Oring 1988c). Another approach would be to survey suitable wetlands for males with broods by visiting wetlands several times during the brood rearing period (e.g. June 15, June 30, July 15), systematically walking through or around the wetland, and counting the number of mobbing males (Colwell, pers. comm.) This would provide estimates of the number of successful males only, rather than all breeding birds, since unsuccessful birds apparently leave the breeding areas. Finally, survey efforts spread over a number of years would be needed to evaluate the effect of variations in precipitation on the species' abundance.

Short-eared Owl (Asio flammeus)

Minnesota status: Special concern

Distribution in Minnesota: Roberts (1932) considered this species to be a "common permanent resident" of marshlands throughout the state. Its current Minnesota range consists of scattered records from 6 counties in northwestern and northcentral Minnesota. It has also been noted that its occurrence is irregular from year to year (Janssen 1987).

Database records: There is only one record for the western CBS counties, from Lac Qui Parle county. The species was not observed during the 1988 field season.

Habitat: A wide array of nesting habitats have been attributed to this species, including native grasslands, marshes, wet meadows, open peatlands, grain fields, fallow fields, forest clearings, and brushy areas (Johnsgard 1979). Territory sizes in Manitoba ranged from 74 to 120 ha (Clark 1975).

Status in the 6 western CBS counties: The Short-eared owl was included among the list of first priority species because there is a great deal of interest in its current status in the state. However, large numbers of observations were not anticipated for several reasons. 1) The relatively small number of recent observations of the species in the last 10 years have been mostly in the northwestern part of the state (from northern Wilkin north) (Coffin and Pfannmuller 1988), so there is some question whether the species regularly occurs south of that area. (Note however, that there is a database record from Lac Qui Parle county in 1978, and John Schladweiler reported a pair of Short-eared owls north of Salt Lake in spring, 1988). 2) The species occupies a variety of wetland habitats (as well as native grasslands) that were largely excluded from survey. I am aware of no data addressing the relative importance of native grasslands to the species. 3) The irruptive nature of the species means that distribution and abundance may vary from year to year. 4) Individuals have large home ranges, so even where they regularly occur, they would be widely dispersed compared to shorebirds and passerines.

Given all this, it is still surprising that no individuals were observed. There are several possible explanations. 1) The survey method was inappropriate for this species, either because large areas of suitable habitat were excluded, or because surveys were not done at the optimum time of day, or both. 2) The species was very rare or absent in the target counties in 1988, either because it is at a low point in its population cycle, or because it never occurs in large numbers there. I frankly do not know which of these is more likely.

Future work on the species in these counties: Survey work specifically targeting this species would be required to determine its distribution and abundance. An evaluation of survey methods is a necessary first step in planning future work. This should be done in an area of the state where the species has been most regularly reported (e.g. Beltrami, Lake of the Woods, or Roseau counties). Time of day, and driving vs. walking, are 2 factors that should be evaluated.

Louisiana Waterthrush (Seiurus moticilla)

Minnesota status: Special concern

Distribution in Minnesota: This species first appeared in Minnesota in the 1880's, then extended its range along the Mississippi and its tributaries. By 1930, it occurred in the southeastern part of the state, as far north as Anoka county and southern Pine county, west to eastern Carver county, but was most numerous along the Mississippi river from Goodhue county south, and along the St. Croix north to Pine county (Roberts 1932). It currently occurs in southeastern and eastcentral Minnesota along the Mississippi, St. Croix, and Minnesota rivers (Janssen 1987), but is believed to have declined in numbers (Coffin and Pfannmuller 1988).

Database records: There were no records for the CBS counties. In 1988, 7 records were obtained in Washington county, representing 11 pairs and 1 male judged to be nonterritorial.
Five of these records were considered to be inferred breeding, one inferred nesting, and one positive nesting.

Habitat: The species occurs in wooded, hilly valleys containing swift streams, usually with more deciduous cover, and less dense cover, than is preferred by the Northern waterthrush (Craig 1985). The latter is also reported to prefer slower moving water (Coffin and Pfannmuller 1988).

Permanent, swiftly flowing streams in steep-sided valleys were the primary habitat targeted for survey work on this species in Washington county. Seven such valleys were visited on foot, and waterthrushes were found in each of them (including CBS sites 58, 96, 182 (north end), 204. Four of the sites were narrow, steep-sided valleys with mostly deciduous cover; 3 had northern hardwood overstories. In several of these areas the stream valleys opened up and became wider; no territorial waterthrushes were found in these portions, although a non-singing male that did not respond to playback was observed in one (site 58).

Four pairs were found in 2 slightly different habitats. One pair, on the south end of site 182, was found in a broad, relatively flat valley with low muddy banks on one side of the stream. The soil was peat, and very wet, with skunk cabbage and impatiens common. The canopy was northern hardwoods. The most unusual habitat was found along the banks of the St. Croix north of site 182. Three abutting territories were found on steep rocky slopes right at the water's edge. There were no ravines at these sites, but water from seeps was trickling down the rocky slopes at several points. A nest with young was found on one of these territories. The nest was located on a 50° slope above a 1.5 m high vertical limestone outcrop. The canopy was dominated by sugar maple and basswood. The river was approximately 100 m wide at this point, and the male that was seen carrying food to the nest several times flew across the river and foraged along the sandy beach on the Wisconsin side.

The 3 sites where waterthrushes were sought, but not found, had habitat that differed in several ways from those described above. One steep-sided valley (site 98) that looked structurally similar to sites 96 and 204 did not contain a permanent stream. The other 2 (sites 61 and 137) had wider, flatter valleys with few or no trees overhanging the streams.

Status in Washington county: All but one of the sites identified as containing potential habitat for Louisiana waterthrushes were in the northern part of the county, and consequently, all but one of the records obtained were also in the northern part of the county. I believe we visited all valleys with permanent streams that fit the classic habitat type preferred by the species. The strong response of all 11 males considered to be territorial, as well as the fact that presumed females were observed on 4 of the sites, is good evidence that the birds were breeding on all sites where they were observed. Many of the sites are subject to at least a moderate amount of human disturbance. Fairy Falls (site 96) is a favorite gathering spot for local teenagers, as evidenced by numerous beer cans and debris below the falls. Most of the stream valleys along the St. Croix have either campsites or cabins on them. One stream valley at Otisville is immediately adjacent to a gravel road that leads to a public landing. Birds are apparently breeding at all these sites, although increased development and disturbance could make these areas unsuitable. In summary, although there are obviously no longer 100's breeding along the St. Croix (as Roberts (1932) reported), this study has doubled the number of known nesting pairs that have been recently reported. I consider it possible that there might be another 10-12 pairs along the St. Croix in Washington county, but it seems unlikely that there are more than that. There are undoubtedly others breeding on the Wisconsin side that may be part of the same population, as well as more farther north along the St. Croix.

Future work on the species in Washington county: If a more precise estimate of the number of pairs breeding in the county is desired, all areas along the St. Croix where seeps form streams that flow into the river should be investigated. The area along the Mississippi north of Hastings was not included in the 1988 survey because John Almendinger knew of no permanent streams there; it could, however, be checked for seeps that might provide suitable habitat.

Chestnut-collared Longspur (Calcarius ornatus)

Minnesota status: Endangered

Distribution in Minnesota: The range of the Chestnut-collared Longspur formerly extended from Jackson county east to Ottertail county, and north to the Canadian border. Although once abundant in Traverse, Grant, and Lac Qui Parle counties, by 1930 this species occurred only on the first sand ridge of Glacial Lake Agassiz (Pennington, Polk, and central Norman counties)(Roberts 1932). Currently it is known to breed only in Clay and Traverse counties, although there is one June record from Big Stone county (Janssen 1987).

Database records: There were 4 records in the database: 2 from the Felton area in Clay county, and one from Clinton prairie in Big Stone county (Janssen 1987), and one from Miller Prairie West in Traverse county. Database records have been updated to include existing records, most of which were collected by Wyckoff (1985), resulting in a total of 16 records for Clay county. In 1988, longspurs were observed on an additional site (#46) southwest of the Felton area in Clay county, as well as on some sites in the Felton area already in the database. An apparently non-breeding bird (female or male in winter plumage) was observed in Lac Qui Parle county. Longspurs were not observed in 1988 on either Clinton Prairie or Miller Prairie West, raising questions about the breeding status of the species on those sites, although Bruce Harris noted that Miller Prairie West appeared to contain suitable habitat for the species.

Habitat: The preferred habitat is grazed or hayed mixed grass prairie (Johnsgard 1979). In North Dakota they are sometimes found in stubble fields, fallow fields or retired fields of crested wheat grass (Agropyron cristatum) (Stewart 1975). This preference for short, sparse cover means that in Minnesota they are found on dry upland tracts that are heavily grazed.

Status in the 6 western CBS counties: Chestnut-collared longspurs were originally designated as a high priority species for 1988 survey efforts, because of their endangered status, and because the survey method was very appropriate for detecting them. The decision to focus survey efforts primarily on high quality prairies undoubtedly excluded much of the potential longspur habitat, although a total of 19 sites from five counties (excluding Wilkin) were identified as possessing at least some potential habitat. As noted above, longspurs were observed on only one of these sites. Drought conditions should have favored the development of shorter, sparser cover on sites that would have been too lush in years of normal precipitation, but there was no evidence from our survey work that longspurs shifted onto such sites in 1988.

In conclusion, the density of Chestnut-collared longspurs in the Felton area has been thoroughly documented by Wyckoff (1985). In view of the failure of 1988 survey work to detect the species outside Clay county, even on the 2 sites where it had previously been observed, the breeding status of the species in the other 5 1988 CBS counties is questionable.

Future work on the species in these counties: The survey method used in 1988 was definitely appropriate for this species. Obtaining better information on the distribution of Chestnut-collared longspurs in these counties would require targeting preferred habitat (i.e. over-grazed pastures), rather than high quality prairies.

American Bittern (Botaurus lentiginosus)

Minnesota status: Special concern

Distribution in Minnesota: Formerly found throughout the state, the species is now most commonly seen in central, northeast and northwest regions, but Janssen (1987) notes that the species "may breed very sparingly throughout the state wherever suitable marsh habitat exists". Coffin and Pfannmuller (1988) report that the American bittern is now "absent from many sites which appear to offer excellent habitat, most notably in southern Minnesota".

Database records: Although some bittern records undoubtedly exist in MOU files, they have not yet been entered into the Natural Heritage database. During 1988 survey work, 5 bitterns were observed in the western counties: 2 from Norman, 1 from Wilkin, and 2 from Lac Qui Parle counties. The latter two observations were slightly farther west than the border of the range for the species shown in Coffin and Pfannmuller (1988). One bittern was observed in southern Washington county.

Habitat: A wide array of wetland habitats are used by this species, including marshes, swamps and bogs with bulrushes, cattails and other emergent vegetation. Nests are found in tall vegetation, usually on dry upland adjacent to a marsh, or on a mound above the water (Roberts 1932, Johnsgard 1979). In North Dakota, the average water depth at 11 nest sites was 14 inches (Stewart 1975). Hanowski and Niemi (1986) analyzed the habitat characteristics of 7 American bittern territories found in 4 Minnesota counties, as part of a comparison of habitat requirements for 4 special concern bird species in Minnesota. They concluded that habitat used by American bitterns is taller and wetter than that used by Sharp-tailed sparrows and Yellow rails.

Status in the 7 CBS counties: The American bittern was not one of the species receiving first priority in 1988 survey work for several reasons. First, it occurs mainly in wetland habitats which were largely excluded from survey. Second, its very secretive habits, and the poor visibility and difficult terrain in its preferred habitat make it a poor candidate for the type of general survey work planned. Finally, a small study, funded by the Nongame small grants program, was done this field season in Washington county by Bob Holtz.

Washington county: Bob Holtz surveyed 16 sites using playback of conspecific vocalization. He observed no bitterns, nor were any reported to him by a network of Washington county observers. One bittern was observed by John Moriarty on site 61 during herp survey work. Negative information is very difficult to evaluate. There is certainly a great deal of apparently suitable habitat in Washington county. It is possible that the survey method used by Holtz was not effective, or that drought conditions made the wetlands he surveyed unsuitable for bitterns.

Western counties: In spite of the fact that wetland habitats were largely excluded from the survey work, and that no sites were chosen specifically because of the likelihood of finding American bitterns on them, many of the sites surveyed contained patches of wetland habitat, and 5 American bitterns were observed on such sites. I do not feel that I can evaluate the status of the species based on our 1988 survey work.

Future work on the species in these counties: As was the case for Short-eared owls, I feel that before a survey of American bitterns can be done, an appropriate survey method must be identified and field tested. In spite of the lack of results obtained in Washington county, playback of conspecific vocalizations still might be an appropriate technique. It is conceivable that some sort of driving survey method involving playback at suitable wetland sites could be developed.

Common Moorhen (Gallinula chloropus)

Minnesota status: Special concern

Distribution in Minnesota: During Roberts' time, this species was common in the southern half of the state, as far north as southern Becker county (Roberts 1932). The species had previously been more abundant, but had experienced a decline after 1900, which has continued to the present. It now occurs locally in the southeast and eastcentral part of the state; most recent nesting records are from the Twin Cities, and along the Mississippi in Goodhue and Houston counties (Janssen 1987).

Database records: There was one record from Washington county and MOU files show a recent record from Lac Qui Parle county. No observations of this species were made during 1988 field work.

Habitat: The species is found in freshwater ponds and marshes with abundant emergent vegetation (Johnsgard 1979). Nests are usually placed above water.

Status in the 7 CBS counties: This species was assigned secondary priority in the 1988 survey efforts for some of the same reasons given above for American bittern: the species occupies wetland habitats exclusively, and it has very secretive habits. I had hoped that Bob Holtz's bittern survey work in Washington county might result in some Common moorhen observations, but they did not. No sightings were expected in the western counties because the species is now considered to be primarily confined to the southeastern and southcentral region.

Future work on the species in Washington county: The Common moorhen is another species that would require a very specific survey effort, and for which there is no established survey method. Experiments with playback at sites where the species is known to occur might be worthwhile. Survey from a boat in wetlands adjoining emergent marshes would also be a possibility.

Burrowing Owl (Athene cunicularia)

Minnesota status: Endangered

Distribution in Minnesota: The species was first seen in the western part of the state in the 1880's, and it spread slowly eastward until, by 1930, it was nesting commonly in Grant, Traverse, Pipestone, Lincoln, and Lac Qui Parle counties; it also bred in the Red River Valley (Roberts 1932). Even at its peak, numbers varied from year to year (Janssen 1987). By the mid-1960's, Burrowing owls bred north to Mahnomen county and east to Jackson county. Since then they have declined and are currently very rare. Before 1988, the last documented breeding was in 1983 in Rock county. Reintroduction efforts were begun in Lac Qui Parle county in 1986, and continue into the present.

Database records: There was one 1980 record from Clay county and one from a site in Big Stone county that has since been destroyed. No Burrowing owls were observed during our 1988 survey work, but 4 breeding pairs with young were seen by other observers in 1988, including one in Traverse county, and one each in Rock, Stevens and Yellow Medicine counties.

Habitat: Heavily grazed pastures with ground squirrel colonies are the preferred habitat (Coffin and Pfannmuller 1988), but the species may use burrows elsewhere, including in roadside ditches.

Status in the 6 western CBS counties: In spite of the species' endangered status, it was not a primary target for CBS survey efforts because it was considered to be extremely rare, or even absent, and does not occupy the high quality prairies on which survey efforts were focussed. Field workers were provided with information on the species' preferred habitat and instructed to be alert for potential habitat as they travelled around the survey counties. As part of the reintroduction effort, a public education campaign has sought to educate farmers about the species in hopes of obtaining sightings from them. The 1988 reports of breeding pairs may well be the results of this campaign. Based on the small number of sightings, we can now say that the species is no longer extirpated in Minnesota, but no further generalizations are possible.

Future work on the species in these counties: The most cost-effective method of obtaining information on this species at the present time would be to continue the public education campaign directed at residents of southwestern Minnesota. Burrowing owls are both conspicuous and appealing; hopefully if residents are made aware of our interest in the species, they will report any observations. When the proposed project to identify appropriate habitat by processing remote sensing imagery is completed, surveys of sites identified would be a logical next step.

Sprague's Pipit (Anthus spragueii)

Minnesota status: Endangered

Distribution in Minnesota: Historically, this species occurred throughout the western prairie regions of Minnesota. By the 1930's it was still common in the Red River Valley area (Wilkin county north to Kittson), east to the last beachline of glacial Lake Agassiz (Roberts 1932). Recently the species is known only from isolated records from Clay and Norman counties (Janssen 1987). One to several singing males have been reported so consistently from the Felton area, that they have been assumed to be breeding there although no direct evidence of breeding has been obtained.

Database records: There is one record from the Felton area of Clay county, and one record from a site that has since been destroyed in Norman county (Rockwell township). The species was not observed in the 6 western CBS counties during 1988 survey efforts, even though the traditional Felton area was visited several times. However, approximately 6 singing males, and adults feeding at least one dependent fledgling were reported from Polk county in 1988 (Lambeth and Lambeth 1988).

Habitat: Extensive area of grassland dominated by grasses of medium height are preferred (Johnsgard 1979). In North Dakota, Sprague's pipit habitat has been described as mixed grass upland prairies, ungrazed to lightly grazed or occasionally mowed; also alkaline meadows and subsaline wet-meadow zones of large alkali lakes may be used (Stewart 1975). In Minnesota, Lambeth and Lambeth (1988) suggest that on remaining grasslands in Minnesota, grazing is required to maintain habitat suitable for pipits. The pipits found in Polk county in 1988 were in a pasture that had patches of grass 6-12 inches high, interspersed with areas of short grass or open ground (Lambeth and Lambeth 1988).

Status in the 6 western CBS counties: Sprague's pipit was not initially included in the list of first priority species, because its extreme rarity made it unlikely that new records would be obtained. However, the focus on high quality prairie resulted in a good probability that all potentially suitable sites were surveyed. (Six sites in Clay county and 4 sites in Norman county were judged in advance to provide potential habitat.) Also, the survey method used was entirely appropriate for this species. The fact that neither Arlene Rothstein, nor any MOU members reported the species from the Felton areas raises questions about its status in Clay county. I am reasonably confident that the species did not occur in the 6 western CBS counties in 1988. It is conceivable that the drought reduced the stature of the vegetation on historical sites, making them unsuitable this year.

Future work on the species in these counties: Survey efforts directed specifically at Sprague's pipits and Baird's sparrows might be repeated on selected sites in Clay and Norman counties in a year of more normal precipitation. If singing males are detected, all reasonable efforts should be made to ascertain if the 2 species are indeed breeding in these counties.

Baird's Sparrow (Ammodramus bairdii)

Minnesota status: Endangered

Distribution in Minnesota: The species once bred from Traverse county north to the Canadian border, and was considered common from Polk northward (Roberts 1932). The last confirmed nesting was in Polk county in 1937. It is now known from a few isolated sightings of singing males in the Felton area of Clay county, the most recent of which were in 1980 and 1986 (Janssen 1987). The only other sighting in the last decade, and the only record away from the northwest region was in Crow Wing county in 1986.

Database records: There is one record from the Felton area in Clay county. The species was not observed during survey work in the target counties in 1988. Two singing males were reported from the Felton area on June 24; one was described as singing "intermittently" for over an hour on Blazing Star SNA, the other was seen along County road 108, about 2.5 miles east of Highway 9, but could not be relocated later on the same day (Eckert 1988). Arlene surveyed Blazing Star on 27 May, and revisited it on 4 June; on neither occasion did she observe Baird's sparrows.

Habitat: In North Dakota the species is found on extensive tracts of idle or lightly grazed mixed grass prairie, also in tall grass along the edge of ponds or lakes, and occasionally on cropland (Stewart 1975). It has also been suggested that the birds may shift in response to annual variations in precipitation, utilizing more mesic sites in dry years (Kantrud and Faanes 1979).

Status in the 6 western CBS counties: The habitat requirements of Baird's sparrows are sufficiently similar to those of Sprague's pipits that they were both considered possible on the same 10 sites mentioned under Sprague's pipit. If the speculations of Kantrud and Faanes (1979) are correct, it is not surprising that Baird's sparrows were not observed on the drier Felton sites where they have been seen in the past. Unfortunately, they were not found on more mesic sites either. As with Sprague's pipits, I feel that the survey method was appropriate for this species and that the most likely sites were included in the 1988 survey. I therefore conclude that they were not breeding in the target counties in 1988.

Future work on the species in these counties: See comments under Sprague's pipit.

Henslow's Sparrow (Ammodramus henslowii)

Minnesota status: Special concern

Distribution in Minnesota: This sparrow was historically found in the southern half of the state as far north as Grant and Isanti counties (Roberts 1932). Janssen (1987), however, notes that it was always an uncommon and local breeder. It is now most commonly found in the southeastern part of the state, but casually in the western part of the state as far north as Norman county (Janssen 1987). The only known breeding population is at O.L. Kipp park in Winona county.

Database records: There were 3 records from 2 CBS counties, Clay and Wilkin. In 1988, a lone singing male was observed on several occasions at Big Stone Refuge in Lac Qui Parle county. Since the species is known to be semi-colonial, and there was no tangible evidence of breeding by this lone male, the bird was recorded as a "breeding season observation", rather than inferred breeding, as observation of singing passerine males are usually categorized. Sites in Clay and Wilkin where singing males had been observed in the last 8 years were revisited; no Henslow's sparrows were observed there. A singing male was reported by a reliable observer from Afton State Park in Washington county, but it apparently did not breed there, as several efforts to relocate it were unsuccessful.

Habitat: According to Johnsgard (1979), the species is found in weedy prairies and meadows, low-lying damp pastures, and rank grassy fields, often with scattered low shrubs. He also notes that it is localized and semi-colonial. At O.L. Kipp park in Winona county, Henslow's sparrows breed in old fields dominated by brome grass (Hanson 1987). In Kansas, the density of standing vegetation was a better predictor of nesting habitat than was the presence of a dense thatch, and areas in which woody vegetation was invading were less preferred (Zimmerman 1988).

Status in the 6 western CBS counties: Henslow's sparrow was not designated as a top priority for 1988 survey work because of its sporadic and unpredictable occurrence in the state, and because a project is underway by Lynelle Hanson to follow up on all reports in an effort to document breeding and assess habitat. Nevertheless, 11 sites in the western counties and 4 sites in Washington county were considered to contain potentially suitable habitat for Henslow's sparrows. The species was not observed on any of them. It is particularly difficult to evaluate the status of Henslow's sparrows in the state because they are not only rare, but sporadic. It may be that most of the lone males observed are wanderers that never attract mates. However, breeding was documented on a site in Hennepin county in 1982 where only 2 singing males were observed (Fall and Eliason 1982).

Future work on the species in these counties: Designing a cost-effective survey method for this species would be extremely difficult, because of its rarity and unpredictability. There is an abundance of apparently suitable habitat in the survey counties, but until habitat selection by Henslow's sparrows is better understood, survey efforts focussing on this species alone hold little promise of yielding results. The most efficient approach would be to maintain the current situation of monitoring the Kipp population, while following up on reports from other areas of the state.

Sharp-tailed Sparrow (Ammospiza caudacutus)

Minnesota status: Special concern

Distribution in Minnesota: Before 1974, this species was known to be resident in the northwestern part of the state only (from Clay county north to the border) (Janssen 1987). It has since been found in appropriate habitat in the northcentral region of the state, where it is considered to be uncommon and local; 1982 records were from Roseau, Mahnomen, Becker, Marshall, Polk, Cass, and Aitkin counties (Janssen 1987). Populations appear to fluctuate greatly from year to year depending on precipitation, being high in drought years and low in wet years (Stewart 1975).

Database records: There was one record from the CBS counties at Anna Gronseth Prairie in Wilkin county. On 4 June, 3 singing males were observed on Western Prairie South (site #24) in Wilkin county, but they could not be relocated on 24 June. A lone singing male was also observed over a period of several days in Lac Qui Parle county (site 140). If this bird was breeding, this would represent a dramatic extension of the species range in western Minnesota. No birds were observed in the Anna Gronseth area; the site on which the species had previously been seen was totally dry by mid-summer in 1988 (Pfannmuller, pers. comm.).

Habitat: The species prefers wet meadows with water less than knee deep, alkaline hummocky fens, marshy zones of lakes and ponds in dry years (Johnsgard 1979). They tend to be somewhat colonial and are non-territorial, so singing may be infrequent, and often occurs late at night or before sunrise (Johnsgard 1979). Hanowski and Niemi (1985) described the habitat where singing males were observed as having abundant small forbs, but low densities of vegetation greater than 30 centimeters in height.

Status in the 6 western CBS counties: Few observations of this species were anticipated, both because wetland habitats preferred by the species were largely excluded from survey, and because surveys were not done at the optimum time of day. Even its reported shift to the marshy zones of lakes in dry years would not have increased the likelihood of observing the species, since these areas were not targeted for survey either. Because Sharp-tailed sparrows have similar habitat requirements to those of Yellow Rails, 18 sites in the 3 northern counties were considered to contain potentially suitable habitat for both species. As already noted, no Yellow rails were observed, and Sharp-tailed sparrows were observed on only one of the sites considered suitable (Western Prairie South), and on one site in Lac Qui Parle county where they were not anticipated. The unpredictable and sporadic nature of this species leads me to be cautious about drawing conclusions from a single male observed outside the currently recognized range.

Future work on the species in these counties: As noted in Coffin and Pfannmuller (1988) the Sharp-tailed sparrow is a difficult bird to survey because of the inaccessibility of its preferred habitat, and its sporadic and mostly nocturnal singing behavior. I would suggest that the 2 sites where singing males were observed in 1988 be revisited to see if the species occurs there in the future. However, before any further survey work is done in the 6 western CBS counties, appropriate survey methods need to developed and

field tested in areas where the species occurs more consistently. If the species is really non-territorial, as suggested by Johnsgard (1979), estimates of density would be virtually impossible to obtain by standard census methods. For a non-territorial species, determination of density would probably require studies of marked individuals.

Greater Prairie Chicken (Tympanuchus cupido)

Minnesota status: Special concern

Distribution in Minnesota: This is a species that has actually benefitted to a certain extent from human settlement because of its use of small grain fields. Birds are believed to have entered the state from the east and south in the mid-19th century, and subsequently spread west and north with settlement (Roberts 1932). By 1880 they occurred throughout the state, except in northeastern and extreme northcentral regions (Coffin and Pfannmuller (1988). A population decline was noticed after 1930, with a sharp decline in the 1950's and 60's (Janssen 1987). By 1982, the species was restricted to the beach ridges of Glacial Lake Agassiz, with about 150 males also found in the northcentral region. Total population estimates, based on censuses by the Greater Prairie Chicken society, increased dramatically between 1978 and 1982, but had declined again by 1985 to about half 1982 levels (817 males in 12 counties).

Database records: Only booming grounds have been entered into the database, and there were records from Clay, Wilkin and Norman counties. In 1988, 1 booming ground was observed in each of the 3 northern counties; these were each judged to be updates of existing records. One nest was found in Wilkin county.

Habitat: Prairie chickens use different habitats for different purposes, and at different times of year. Booming grounds are found on native grasslands with short grass, as well as in small grainfields. Nests are placed in ungrazed meadows or hayfields in cover 30-38 cm high (Coffin and Pfannmuller 1988).

Status in the 6 western CBS counties: No sites were selected for survey specifically because they contained suitable prairie chicken habitat, because of the ongoing efforts of the Prairie Chicken Society to monitor this species. The fact that we discovered no new booming grounds would suggest that the Society is doing a good job. No new conclusions can be drawn as a result of our 1988 survey efforts.

Future work on the species in these counties: As noted above, survey work focussed specifically on this species is being done by the Prairie Chicken Society. This would seem to be the most appropriate approach for monitoring Greater Prairie Chicken numbers, although it provides no direct information on reproductive success. Acquiring such information would require focussing on nesting habitat and probably dragging chains to flush nesting females.

Sandhill Crane (Grus canadensis)

Minnesota status: Special concern

Distribution in Minnesota: The species was common in the state before 1880, but had become rare by 1900, and by 1930 occurred locally in just a few areas in the northwestern part of the state. The decline was attributed to over-hunting as well as drainage of marshes (Roberts 1932). Since 1950, numbers have been increasing and two separate populations are now recognized, one in the northwestern part of the state and one in the east-central part of the state. By 1985, breeding had been documented from 8 northwestern counties and 9 east central counties, with resident birds observed in a total of 23 counties (Tacha and Tacha 1985).

Database records: All sightings, not just breeding records, have been included in the database, and there are numerous records from throughout the range listed above. Breeding had not been documented in the 6 western CBS counties; one May record from Twin Valley WMA in Norman county may represent a late migrant (Tacha and Tacha 1985). In 1988, a pair of cranes judged to be territorial were observed on Agassiz-Olson WMA (site #19) in northern Norman county.

Habitat: Preferred habitat includes large, shallow marshes and meadows that are relatively isolated, interspersed with diverse upland areas ranging from prairie and agricultural fields to wooded ridges. Also used are open peatlands where the water is less than one foot deep (Tacha and Tacha 1985). Nests are found in or near shallow water (up to 8 inches deep), in wet meadows, marshes, or adjacent uplands (Johnsgard 1979).

Status in the 6 western CBS counties: The likelihood of observing breeding Sandhill Cranes in the survey counties was deemed to be low, and only 2 sites in northern Norman county were selected for survey with this species in mind. A pair of cranes were observed on one of them, as noted above. Access to the other potential site (#18) proved too difficult, so it was not surveyed. The very site tenacious behavior of the pair observed indicates that they were probably breeding on the site. Breeding elsewhere in the western CBS counties is unlikely.

Future work on the species in these counties: Efforts should be made to revisit the site where the pair were observed in 1988. Also, the adjacent site which was not visited in 1988 would definitely be worth checking.

Loggerhead Shrike (Lanius ludovicianus)

Minnesota status: Threatened

Distribution in Minnesota: Once common south and west of the coniferous forest (Roberts 1932), the Loggerhead shrike has declined sharply in numbers in recent years, especially in south and central regions of the state (Janssen 1987). Breeding bird surveys showed a 50% decline in observations between 1967 and 1980. Current information of the species range in Minnesota from Temple and Brooks (1986) indicates breeding in 12 counties in the southeast, southcentral and western region, with additional summer observations of birds in the northwest, central and southwestern parts of the state.

Database records: There were 9 records from Clay county and 3 from Lac Qui Parle county. During 1988 survey work, 8 pairs of Loggerhead shrikes were observed, 3 in Lac Qui Parle, 4 in Clay county, and 1 in Washington county. Clay and Lac Qui Parle were among the 6 counties extensively studied by Temple and Brooks; one of the 3 pairs in Lac Qui Parle and all 4 pairs in Clay county were near former nest sites found by Temple and Brooks in 1986 or 1987, and so were considered updates of those records. The Washington county observation was also considered to be an update of an existing record.

Habitat: Open country and dry upland prairie with scattered trees are preferred (Coffin and Pfannmuller 1988). Nests are found disproportionately in thorny trees or shrubs, either isolated or in small thickets (Johnsgard 1979).

Status in the 6 western CBS counties: Loggerhead shrikes were not considered to be first priority species for 1988 survey work for 2 reasons: 1) the habitat they prefer is not high quality prairie, and therefore was largely excluded from the survey plan, and 2) they are much better suited to the type of driving survey conducted by Temple and Brooks (1986). Although 4 sites in 3 counties were considered to be contain potential Loggerhead shrike habitat, no shrikes were observed on them. Shrikes were detected either while driving through the survey counties, or on areas adjacent to survey sites. The fact that no shrikes were observed in the other 4 counties suggests that they may be rare or absent there.

Temple and Brooks (1988) reported 13 pairs of shrikes in Clay and 5 pairs in Lac Qui Parle county based on their 1986-1987 survey work. Overall they observed a 41% decline in number of pairs located between 1986 and 1987, and a 32% decline between 1987 and 1988, suggesting that shrike population size in the state is at least somewhat unstable, and may be declining.

Future work on the species in these counties: Although the declines observed by Temple and Brooks may represent short-term fluctuations, they indicate a need for continued monitoring of the species of the sort begun by Temple and Brooks.

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Table 1. Dates of bird survey work done in 6 western CBS counties during 1988.

County	Date		
	May	June	July
Norman	21,27	22,27-30	3,4
Clay	19-31	1-9	
Wilkin	23-24	4,10-13,16-19 24-25	1
Traverse		27-30	
Big Stone		7-21,27	5
Lac Qui Parle	15,19,23-27, 31	1-8,13,17,18, 21,25,30	

Table 2. Numbers of sites surveyed and records obtained by field workers in 6 western CBS counties in 1988. Numbers in parenthesis are numbers of sites on which listed species were observed. Key: BH=Bruce Harris, AR=Arlene Rothstein, JS=John Schladweiler, LP=Lee Pfannmuller, V=MOU volunteers.

	Personnel				
County	BH	AR	JS	LP	V
Norman		16(8)		3(2)	2(1)
Clay		37(20)			
Wilkin		27(7)		6(2)	2(2)
Traverse	10(2)				
Big Stone	35(26)			3(1)	
Lac Qui Parle	26(16)		8(8)		6(1)
TOTALS	71(44)	80(35)	8(8)	9(4)	13(5)

Table 3. Summary of bird element occurrences from survey sites in 6 western CBS counties in 1988 (incidental observations excluded).

County	No. of sites	Acres surveyed	Sites w/records	Number of records			
				UpSa	MaGo	other	TOT
Norman	21	1470	11	8	2	6	16
Clay	37	3820	20	16	11	2	29
Wilkin	35	3170	11	7	4	5	16
Traverse	10	820	2	2	0	0	2
Big Stone	38	2935	27	25	5	1	31
Lac Qui Parle	40	4825	25	24	4	8	37
TOTALS	181	17040	96	83	26	22	131

Table 4. All bird element occurrences broken down by species and county. Asterisks indicate counties with no previous records for the species. The number in parenthesis shows the portion of the total that were incidental observations. "b" indicates booming grounds. Zeroes are shown where the species was considered possible, but not found.

	Norman	Clay	Wilkin	Traverse	Big Stone	Lac Qui Parle	Washington	TOTAL
Red-shouldered Hawk							12*	12
Upland Sandpiper	11	19	11	2*	25	28		96(13)
Marbled Godwit	3	14	8	0	7	5		38(11)
Wilson's Phalarope	2	0	3	0	1	5		11(0)
Louisiana Waterthrush							7*	7
Ch.-collared Longspur	2	0	0	0	0	0		2(0)
American Bittern	2*	0	1*	0	0	2*	1*	6(1)
Henslow's Sparrow						1*	1*	2(2)
Sharp-tailed Sparrow				1			1*	2(0)
Gr. Prairie Chicken	b1,1*	b1	b1	0		0		3b,1(0)
Sandhill Crane	1*							1(0)
Loggerhead Shrike	0	0	0	0	0	1		1(1)
TOTAL								179(28)

Table 5. Rare bird species considered to be top priority for 1988 CBS survey efforts and information about their occurrence in CBS counties. Species shown were the primary focus of survey efforts, either because the potential for obtaining good information about their distribution was high, or because there is a great deal of interest in their current status. Key: X=pre-1988 records from the Natural Heritage database or MOU files of at least inferred breeding (see Appendix 2 for definition of inferred breeding); #=new records obtained during 1988 survey where none existed before survey; ?=potential habitat, but no verified records.

	Norman	Clay	Wilkin	Traverse	Big Stone	Lac Qui Parle	Washington
Red-shouldered Hawk							#
Yellow Rail	?	?	X				
Upland Sandpiper	X	X	X	#	X	X	?
Marbled Godwit	X	X	X	X	X	X	
Wilson's Phalarope	X	X	X	?	X	X	
Short-eared Owl	?	?	?	?	?	X	
Louisiana Waterthrush							#
Chestnut-collared Longspur	X		X	X	?		

Table 6. Rare bird species considered to be of secondary priority for 1988 CBS bird survey efforts. Less effort was planned for these species, either because there was little likelihood of obtaining good information about their distributions (those marked with 2), or because other sutdies (planned or completed) will provide, or have provided, information about their distributions (those marked with 3). Key: same as Table 5, except for N=1988 record from non-CBS source

	Norman	Clay	Wilkin	Traverse	Big Stone	Lac Qui Parle	Washington
2American Bittern	#	?	#	?	?	#	#
2Common Moorhen							X
2Burrowing Owl		X		N	X	?	
2Sprague's Pipit	X	X					
2Baird's Sparrow		X					
2Henslow's Sparrow	?	X	X	?	?	#	?
2Sharp-tailed Sparrow	?	?	X			#	
3Gr. Prairie Chicken	#	X	?		?	?	
3Sandhill Crane	#						
3Loggerhead Shrike	?	X	?	?	?	X	X

Table 7. Information on Northern harriers observed during County Biological Survey bird survey work, 1988.

County	No. of sites surveyed	Area surveyed (acres)	No. of sites w/ harriers	No. of individuals	Comments[1]
Norman	21	1470	3	5	2 adults on each of 2 sites, 1 U
Clay	37	3820	1	2	F flushed, mobbed, M appeared, circled
Wilkin	35	3170	6	6	2 M, 1 F, 3 U
Traverse	10	820	0	0	
Big Stone	38	2935	2	2	1 F, 1 U
Lac Qui Parle	40	4825	3	3	2 M, 1 U
TOTAL	181	17040	15	18	

[1] M = adult male, F = adult female, U = sex undetermined

Table 8. Information on Dickcissels observed during County Biological Survey bird survey work, 1988.

County	No. of sites surveyed	Area surveyed (acres)	No. of sites w/ dickcissels	No. of individuals	Comments[1]
Norman	21	1470	2	2	2 singing M
Clay	37	3820	0	0	
Wilkin	35	3170	3	11	11 singing M
Traverse	10	820	0	0	
Big Stone	38	2935	9	22	22 singing M
Lac Qui Parle	40	4825	9	22	21 singing M, 1 U
TOTAL	181	17040	23	57	

[1] M = adult male, U = sex undetermined

Table 9. Distribution of survey times in 4 counties for sites with and without Upland sandpipers. Numbers in parenthesis are proportions of total sites in each category.

	Start times						
	0500	0600	0700	0800	0900	1000	Sum
Sites w/Upsa	9	23	8	14	15	3	72
	(0.13)	(0.32)	(0.11)	(0.19)	(0.21)	(0.04)	
Sites w/o Upsa	17	10	15	15	18	1	76
	(0.22)	(0.22)	(0.20)	(0.20)	(0.24)	(0.01)	
TOTAL	26	33	23	29	33	4	148
	(0.18)	(0.22)	(0.16)	(0.20)	(0.22)	(0.03)	

Table 10. Survey methods and number of sites surveyed for birds in Washington county in 1988.

Survey method	no. of sites
walk only	4
walk + playback	5
walk + drive/or boat + playback	6
drive + playback	5
boat or canoe + playback	17
Total	37

Table 11. Survey results for Upland sandpipers in 6 western CBS counties in 1988 (incidental observations excluded).

County	Sites surveyed	Sites observed/ expected[1]	Total sites observed[2]	Pairs observed[3]	Pairs/ 100ac[4]
Norman	21	6/18	8	15	1.0
Clay	37	13/25	13	20	0.5
Wilkin	35	7/25	7	11	0.3
Traverse	10	2/10	2	2	0.2
Big Stone	38	22/29	25	31	1.1
Lac Qui Parle	40	15/23	23	34	0.7
Total	181	65/130	78	113	$\bar{X}$=0.6

[1] proportion of sites where species was expected that it was found

[2] actual sites on which species was observed; these may include sites where not expected

[3] minimum estimates

[4] number of pairs observed/total acres surveyed

Table 12. Survey results for Marbled godwits in 6 western CBS counties in 1988.

County	Sites surveyed	Sites observed/ expected[1]	Total sites observed[2]	Pairs observed[3]	Pairs/ 100ac[4]
Norman	21	1/ 9	2	2	0.14
Clay	37	8/23	11	13	0.34
Wilkin	35	3/22	4	4	0.13
Traverse	10	0/ 1	0	0	0
Big Stone	38	5/16	5	5	0.17
Lac Qui Parle	40	2/20	4	4	0.08
Total	181	19/91	26	28	$\bar{X}$=0.17

[1] proportion of sites where species was expected that it was found

[2] actual sites on which species was observed; these may include sites where not expected

[3] minimum estimates

[4] number of pairs observed/total acres surveyed

Appendix 1. Categories of records for Upland sandpipers, Marbled godwits, and Wilson's phalaropes observed during 1988 CBS bird survey work.

UPLAND SANDPIPER

County	Survey				Incidental			
	PN	IN	IB	BSO	PN	IN	IB	BSO
Norman			8				3	
Clay			13	3			3	
Wilkin			7				4	
Traverse			1	1				
Big Stone	1	2	18	4				
Lac Qui Parle	3	2	14	6			2	1
Totals	4	4	61	14			12	1

MARBLED GODWIT

County	Survey				Incidental			
	PN	IN	IB	BSO	PN	IN	IB	BSO
Norman			1	1			1	
Clay			3	8			1	2
Wilkin			3	1			3	1
Traverse								
Big Stone		2	2	1	1	1		
Lac Qui Parle			2	2				1
Totals		2	11	13	1	1	5	4

WILSON'S PHALAROPE

County	Survey				Incidental			
	PN	IN	IB	BSO	PN	IN	IB	BSO
Norman			1	1				
Clay								
Wilkin	2		1					
Traverse								
Big Stone			1					
Lac Qui Parle		1		4				
Totals	2	1	3	5				

Appendix 2. Guidelines for acquiring records suitable for entry into the Natural Heritage database.

Guidelines are provided below for the nature of observations that constitute an EO for each of the bird species that are of special interest for the County Biological Survey field work in 1988, and for how much effort to expend in acquiring evidence of nesting.

The Natural Heritage database for birds has, until 1988, been oriented toward breeding records only. Inclusion in the database has required that observations fall into one of three categories of breeding evidence: positive nesting (PN), inferred nesting (IN), and inferred breeding (IB). PN or IN observations (e.g. a nest, recently fledged young, or adults carrying food) are relatively straightforward, but the IB category requires guidelines that will vary depending on the biology of the species.

The 1988 field work has yielded approximately 30 observations of listed species in habitat appropriate for nesting, but for which no direct evidence of nesting was obtained. To preserve this potentially valuable information, a new category has been devised for bird records termed "breeding season observation" (BSO). This category includes single observations of one or more birds during the breeding season (dates will vary depending on the species). Placement in this category is not meant to imply that the birds are not breeding on the site, only that no evidence of breeding sufficient to assign them to the IB category was obtained.

The existing categories for avian records in the Natural Heritage database are now:

Positive nesting (PN): nest with eggs, adult sitting on nest constantly, or eggshells near nest; young in nest; downy young or young still unable to fly seen away from nest

Inferred nesting (IN): adults seen building nest, in distraction display (i.e. feigning injury by fluttering on the ground), carrying fecal sac, or carrying food; fledglings seen in area

Inferred breeding (IB): 1) during standardized breeding bird census, 2 or more noncontemporaneous occurrences of a species at a given observation station within the same season; 2) repeated sight records made at a given location within or between seasons (excluding species known to "loaf" in non-breeding areas such as white pelicans and loons); 3) behavior of birds interpretted by a qualified observer to be territorial, or related to nesting, even if based on one observation. Excepted from these criteria are species known to be vagrant or sporadic in their occurrence, and/or that tend to be semi-colonial, but in which lone singing males are sometimes observed (e.g. Sharp-tailed and Henslow's sparrows). For these species, only repeated sightings of single individuals in the same area between seasons, or a single sighting of multiple individuals in one area are considered to be in this category.

Breeding season observation (BSO): single observations of a species during the breeding season (dates will vary depending on the species) in habitat considered by a qualified observer to be appropriate for nesting, but with no evidence of breeding (e.g.

no singing or other territorial behavior). For species such as Sharp-tailed and Henslow's sparrows, as described above, single singing males, even if observed more than once during the season, will be considered in this category.

Revised guidelines for obtaining records for listed species

Red-shouldered Hawk: Vocalization and/or approach of adults in response to playback of Great Horned Owl or Red-shouldered Hawk vocalization in appropriate habitat is IB. An observation of one or two soaring adults in appropriate habitat during the breeding season (April-June) is a BSO.

Yellow rail: An observation of a vocalizing bird is IB. An observation of a silent bird in appropriate nesting habitat is a BSO.

Upland sandpiper: A bird giving an advertising "song", or mobbing (persistantly vocalizing and following an intruder) by one or more birds is IB. Two noncontemporaneous observations on a site is IB. A distraction display (see definition above) is IN. An observation of one or more non-singing birds in appropriate nesting habitat is a BSO.

Marbled godwit: Mobbing (persistantly vocalizing and following an intruder) by one or more birds is IB. Two noncontemporaneous observations on a site is IB. A distraction display (see definition above) is IN. An observation of one or more birds in appropriate nesting habitat is a BSO.

Wilson's phalarope: Same as Marbled godwit.

Short-eared Owl: An observation of one or more birds hunting or flushed from the ground in appropriate nesting habitat is a BSO. Two observations in the same area is IB.

Louisiana Waterthrush: A singing male or agitated behavior in response to playback by one or more birds is IB. A silent bird in appropriate breeding habitat is a BSO.

Chestnut-collared longspur, Baird's sparrow, or Sprague's pipit: A singing male or two noncontemporaneous sightings of adults in appropriate habitat is IB. A non-singing adult in appropriate habitat is a BSO.

Henslow's sparrow or Sharp-tailed sparrow: (These 2 species are placed in a separate category because they are known to be irregular and somewhat unpredictable in their occurrence. Although lone singing males have been reported from various areas of the state, breeding by such males has not (to my knowledge) been documented. Therefore, one observation of multiple singing males, or repeated sightings of one singing male made at a given location between seasons would be IB. Single or repeated observations of a lone singing male within one season are BSOs.

American bittern: A vocalizing male or two separate observations of an adult is IB. A nonvocalizing bird in appropriate nesting habitat is a BSO.

Common moorhen: Two noncontemporaneous sightings is IB. A single sighting in appropriate habitat is a BSO.

Burrowing owl: Sighting of multiple birds in appropriate nesting

habitat is IB. Sighting a single bird in appropriate habitat is a BSO.

Greater prairie chicken: Nests and young broods will now be enterred in the database. Observations of single individuals will not.

Sandhill crane: Sighting of two birds in appropriate habitat that remain in area inspite of intruder or two noncomtemporaneous sightings is IB. Sighting of an individual bird in appropriate nesting habitat during the breeding season is a BSO.

Loggerhead shrike: An observation of one or two adults in appropriate nesting habitat is IB (because there is no evidence of non-breeding adults being present during the breeding season).

Appendix 3. INSTRUCTIONS FOR FIELD WORKERS: Minnesota County Biological Survey - 1988 Bird Survey Work

I. Goals

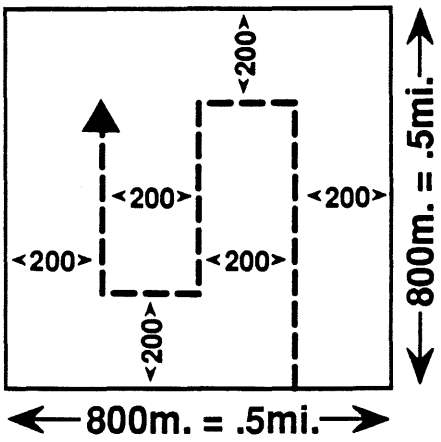
A. Records for the Natural Heritage Database: our primary goal is to determine the distribution of selected rare bird species in the 7 counties that have been chosen for this pilot study. The species of interest (henceforth referred to as "listed species") have been selected from the 1984 list of Minnesota's rare and endangered species. Table 1 shows these species and the counties in which they might occur. The Natural Heritage database for birds is oriented toward breeding records, so I've tried to set up the survey method to improve chances of getting such records. More about this later.

B. Species lists for sites of interest: Our second goal is to construct a species list for selected sites with minimum estimates of numbers of birds observed. Therefore, even if no listed species are observed on a site, we will still have some information on the avifauna of the site to add to the existing plant information. (The copy of the work plan that you have received describes the process of site selection.)

II. **Survey method**

A. The survey method is also described in the work plan, but I will repeat it here. The general plan is to walk across the site on parallel paths that are approximately 200 meters apart, and to record all individuals seen or heard within 100 meters on either side of the observer. The idea is to cover the plot thoroughly, but to avoid recording the same individuals more than once (if possible), so you should try to keep track of movements of birds as you walk along. We hope to draw conclusions about <u>minimum</u> numbers of birds present, so be conservative in your recording. For example, if a Marbled Godwit flushes from the ground in front of you, watch where it lands, if possible. If it flies 500 meters and lands on the other side of the plot, be cautious about recording another godwit when you walk through that area. For our purposes, it is better to underestimate numbers than to overestimate them.

Illustration of survey path:



If you don't feel comfortable with estimating the 200 meter distance between legs of the survey path, pace them off. Also, a compass may come in handy to keep you on a straight course.

B. Time to complete survey: Try to maintain a steady pace, but if necessary pause for identification, or to check an area from which a bird has flushed for a nest or young. The survey path for a quarter section will be about 1.5 miles. Depending on terrain, this might take 1.5 to 2 hours.

C. Revisiting sites: If you observe listed species on a site, but do not observe evidence of nesting, you should try to revisit the site. Acceptable evidence of nesting varies among species. Guidelines for each species are given in Appendix 1.

D. Problems with carrying out the plan as described

1. Sites of irregular shape: apply the general rule of surveying strips 200 meters wide, and do the best you can. The exact path you take is not critical; just try to sketch it on the section map that will accompany the data sheet (see below under "Maps") as accurately as possible.

2. Sites with impassable obstacles (shrub swamp, cattail marsh, ditches, streams, etc.): shift route to avoid them. Some of these decisions might be anticipated by looking at bluelines and section maps before-hand, and trying to determine several access points that could be used if possible. For example, if a site is split down the center by a stream that can't be crossed, could you get to one half from a road on one side of the stream, then go back to the road, and get onto the other half from a road on the other side? If there is no reasonable way to survey part of a planned site, just do as much as you can, and make notes on the section map to indicate what you did and did not survey.

3. Burns: some of these sites or portions of them may have been burned this spring. If it has been several weeks since the burn, it may still be worth surveying the site. Use your own judgment on this. If you do survey a burned site, be sure to indicate the area burned on the section map, and also note the burn on the "current land use" section of the survey data sheet (see below under "Forms"). If you don't survey the site, indicate this, and very briefly give the reason, on the site log under "date surveyed" (see below).

4. Accessibility: I have tried to avoid sites that have poor access (i.e., that would involve more than a half-mile of hiking just to get to the starting point). However, I may have inadvertently overlooked this problem for some sites. Also, especially in the northern counties, some of the field roads

needed for access can be impassable because of mud, down trees, etc. If you cannot find a reasonable access point to a site, omit it, and note on the site log why you have done so.

5. Other unforeseen conditions: It is conceivable that a site may have been plowed up, is being hayed when you arrive, or has a foot of standing water throughout. Again, use your judgment here, and note on the site log if you decide not to survey the site.

E. Time of day: Start as soon after sunrise as it's light enough to se and stop at around 11:00 or sooner if it gets so hot that you notice a decrease in bird activity.

F. Suitable field conditions

1. Rain: intermittent drizzle ok, downpour no. If rain forces you to stop a survey mid-way, return to redo it if you have covered less than half of the site.

2. Wind: it tends to be windy on the prairies, as you probably know. High winds make it impossible to hear the birds, so if wind is greater than 20 mph, give up until it calms down.

3. Standing water: I don't expect you to slog through knee deep water, but you're probably going to have to get your feet wet to do some of these sites. Use your judgment about avoiding water too deep to easily walk through.

III. **Maps** - you will be provided with maps of various scales

1. County highway maps without sites shown: to help you find your way around the counties.

2. County highway maps with sites drawn: site numbers of sites that will be surveyed are circled.

3. Topo and blueline maps (larger scale than county maps; based on aerial photos): I have mapped the boundaries of sites for survey on these maps in green. These quad maps are referred to by either map name or DNR map code (both shown in the lower right corner of the map). Also written on the lower right corner are the site numbers of sites located on that map. You may find it helpful to take at least the blueline for a site along with you when you do a survey to help keep track of where you are on the ground. A plexiglass map holder has been provided for this purpose.

4. Xerox copies of topo or blueline maps showing sites. In some cases (e.g., when there was only one or a few sites in a particular quad) I didn't order the whole map, but have provided you with copies of the relevant portions of the map.

5. Section maps: For each site you will be provided with a section map (made from low level air photos). These will be arranged by site number in folders labelled with the county name. You will attach these to the survey form and map on them your survey route and any observations of listed species (you may want to use a colored pencil or waterproof pen to do this). As you will find out, some of these maps did not copy very well. They were made from originals used by the plant survey people, and the best ones not only show topographic features, but also have notes on the vegetation. Both of these factors should help you to locate your position on the ground and help you to map your route and sightings as accurately as possible. If any map is missing, or too dark to be usable, use a blank 8.5 x 11" sheet of paper with a square drawn to indicate the section lines, and draw the approximate site boundaries yourself. In some cases, we couldn't get section maps. For these sites, copies of topos or bluelines have been made.

IV. Forms

A. Site logs

1. There is one of these for each county and they list each site that has been selected for survey. Sites are indexed by County Biological Survey site numbers, and it is important for data management that sites are referred to by these numbers on field data forms. Site logs also show the legal description of the site and any subsites that have been identified. I have attempted to divide larger sites into units of approximately 1/4 section (160 acres) for survey purposes. Also shown are DNR map codes for quad maps on which sites are located, and possible species to be alert for. The latter is just a guess, so don't fret if a species listed isn't observed.

2. You will fill in the "Date surveyed" and following columns. If a site is revisited, you will fill in the date and if you succeed in getting evidence of nesting for a listed species on your revisit, you will fill out an Incidental Observation Form (IOF; see below), and indicate Y on the site log under IOF.

B. Bird Survey Data Sheet

1. General: use a #2 pencil (so it's dark enough to xerox, and won't run if wet), and <u>please</u> write legibly.

2. The numbers in the following explanation refer to numbered lines on the attached copy of the form:

(1) This will be checked only if you decide to revisit a site (see above under "revisiting"). If site is revisited, put date revisited here, if revisit results in another observation, fill out Incidental Observation Form and

(1) check if plan to revisit ____
date revisited _____

MINNESOTA COUNTY BIOLOGICAL SURVEY - BIRD SURVEY DATA SHEET

Quad map name and code: _____ County: _____ (2)
Observer: _____ CBS site #: _____ (3)
Subsite legal description: T____N R____W 1/4 sec. _____ (4)
Acreage surveyed: _____ (5)
Date: _____ Time start: _____ end: _____ (6)
Weather: Temp. _____ F. Wind _____ Sky _____ (7)
Current land use: _____ (8)

(9) Observation categories*
sσ♂, usσ♂, ad (cf, cnm, dd, mo), br, fj, nfj, fo, n(e,y)

SPECIES	OBSERVATIONS	SPECIES	OBSERVATIONS
Marbled godwit		Gray catbird	
Upland sandpiper		Brown thrasher	
Wilson's phalarope		American robin	
Greater prairie chicken		Starling	
		Yellow warbler	
		Common yellowthroat	
		House sparrow	
		Bobolink	
		Western meadowlark	
		Yellow-headed blackbird	
		Red-winged blackbird	
		Brewer's blackbird	
Mallard		Common grackle	
Blue-winged teal		Brown-headed cowbird	
Swainson's hawk		Dickcissel	
Northern harrier		American goldfinch	
American kestrel		Savannah sparrow	sσ♂(HM11) adcf n4e
Ring-necked pheasant		Grasshopper sparrow	
Gray partridge		LeConte's sparrow	
Sora		Vesper sparrow	
Killdeer		Clay-colored sparrow	
Mourning dove		Swamp sparrow	
Black-billed cuckoo		Song sparrow	
Great horned owl			
Common flicker			
Eastern kingbird			
Western kingbird			
Willow flycatcher			
Alder flycatcher			
Horned lark			
Tree swallow			
Bank swallow			
Barn swallow			
Blue jay			
Common crow			
House wren			
Sedge wren			

*Observation categories: singing male, unseen singing male, adult (carrying food, carrying nesting material, distraction display, mobbing), brood, flying juvenile, non-flying juvenile, flying over, nest(eggs, young)

Check if continued on reverse _____ BCE, 1988

Species	Observation categories so?, usc?, ad (cf, cnm, dd, mo), br, fj, nfj, fo, n(e,y)

(10) Comments: (include here species expected, but not present, and possible reasons; also any reasons to return)

attach to survey sheet. If revisit yields no additional information, write "N" after IOF. It is important to document negative as well as positive information in this way.

(2) Lines 2-4 can be filled out before you go into the field) Quad map name and code are shown on site log. County: self-explanatory. CBS site number: shown on site log; there is a unique sequence for each county. Subsite legal description: also found on site log.

(5) Actual acreage surveyed: This number will allow us to convert abundance estimates into numbers per unit area. Estimate it by assuming that each leg of your path surveys a strip 200 meters wide. You will be provided with a template that can be laid over bluelines or topos and is gridded off down to 10 acres. In the simplest case, if the site is a perfect 1/4 section, and you walk a path as diagrammed above, you will be surveying approximately 100 acres (not the complete 160 in the 1/4 section because you will have missed a strip 100 m wide at the boundaries).

(6) Date: use the format 01 June 1988 Time: self-explanatory

(7) Weather: estimate these factors

(8) Current land use: you may be the only CBS person to visit many of these sites this year, so indicate whatever you're able to determine about the site (e.g., grazed, mowed last year or this year, burned, etc.)

(9) Record observations by placing the appropriate symbol for each individual observed on the line after the species name. The categories are explained at the bottom of the data sheet. Since many of your observations will be in the singing male category, you may want to leave a space for hash marks after the first singing male symbol and record all singing males in that way, rather than repeating the symbol for each individual (see example on attached data sheet). To facilitate extraction of information for entry into the database, the names of the most common listed species are printed on the data sheet. Save the lines below these for any other listed species you may encounter. Some of the most common species you are likely to observe are printed below these lines in checklist order. Begin writing the names of any other species you see below this in the order you encounter them. The name of each species observed will appear only once on a data sheet; additional individuals will be recorded by placing an appropriate symbol for each individual in the space following the name.

If necessary, continue your list on the back of the sheet (after checking at the bottom).

(10) Comments: use this space for the things listed and anything you think should be noted about the survey or the site. Arlene: You may not initially be able to make comments about possible reasons for the absence of a listed species, but after seeing them a few times in particular habitat, you may get a feeling for it.

C. Incidental Observation Form

1. This form will be used for two purposes: to record repeat observations of a species made on a revisit to a site (as described above), and to record any observations of listed species made while travelling around in the survey counties. As noted in the work plan, some of the listed species are likely to be encountered only incidentally, so this type of observation will be very important for those species. Review habitat descriptions found in Appendix A of workplan and be alert for observations of listed species when you encounter appropriate habitat anywhere in the CBS counties.

2. Because this form will also be used by botanists and area wildlife managers to record their observations, I have printed a list of the species of interest and their preferred habitats on the back.

3. The numbers in the following explanation refer to numbered lines on the attached copy of the form; self-explanatory items are omitted.

(2) Species: give common name EO: Write yes only if the observation meets the criteria for one of the categories of breeding evidence (See Appendix 1).

(3) There won't be a site number for many individual observations.

(5) It's important to get the legal description as precise as possible for mapping purposes.

(7) and (8) These are mostly for non-ornithologists who will be using this form.

(9) Habitat: general description

(10) Behavior: include here any observed behaviors that would be relevant to placing the observation in a particular category (i.e., PN, IN, IB).

(1) check if based on revisit_____

Minnesota County Biological Survey - Bird Incidental Observation Form

(2) Species: _____ EO(y/n)_____County: _____

(3) Date: _____ Observer: _____ CBS site# _____

(4) # of individuals, age, and sex (if known)_____

(5) Legal description to 1/4 1/4 sec. T_____N R_____W_____

(6) Quad map name and code: _____

(7) How identified (i.e. song, key field marks, etc.)_____

(8) Certainty of identification:_____

(9) Habitat:_____

(10) Behavior:_____

(11) Comments:(if nest, include number eggs or young)_____

BCE,1988

Bird species of particular interest for County Biological Survey

Western Counties

Species	General Habitat
Sprague's Pipit	prairie
Baird's Sparrow	prairie
Marbled Godwit	prairie
Upland Sandpiper	prairie
Chestnut-collared Longspur	heavily grazed prairie
Wilson's Phalarope	prairie, wetlands
Short-eared Owl	prairie, marsh, bog
Sandhill Crane	prairie, marsh, bog
Henslow's Sparrow	rank prairie, old field
Greater Prairie Chicken	prairie, agricultural land
Sharptailed Sparrow	wet prairie, fen, marsh
Yellow Rail	wet prairie, sedge meadow
Burrowing Owl	pastures with ground squirrel burrows
American Bittern	marsh, fen, bog
Loggerhead Shrike	open country with scattered or clustered shrubs or small trees

Washington County

Louisiana Waterthrush	steep wooded ravines with fast moving streams
Red-shouldered Hawk	moist woods, floodplain forest
Common Moorhen	sloughs, swampy lakes
Henslow's Sparrow	rank prairie, old field
Loggerhead Shrike	open country with scattered or clustered shrubs or small trees

(11) Comments: Put any other data here.

V. **Preparing in advance for surveys**

A. Landowner contacts: Whether sites are publicly or privately owned is shown on the site log.

1. Bruce: You should contact the refuge manager at Big Stone NWR (Jim Heinecke), and ask him for a copy of the existing information on breeding birds (including locations within the refuge, if they are available). Arlene: You may want to contact Brian Winter at Bluestem Prairie to see if he has any information about breeding birds; he may also know some of the landowners in the area.

2. It is important to try to contact landowners before going on their land. You have been provided with plat books showing land ownership, but some of this information is quite outdated. The botanists that have worked in these counties recommend the more direct approach of visiting the nearest farm to the site, and asking about ownership. If the person contacted is not the owner, and indicates that the owner lives far away, ask if the owner is likely to object to your presence on the site. Here again, you need to use your own judgment. If you've decided to survey a site without contacting the owner and you arrive at the site to find someone working in the field next to the site, it would be wise to try to talk to that person at that point. If someone approaches you while you are surveying a site, take time to explain what you are doing. Try to do your landowner contacts in the afternoon or evening, or on rainy days, but if that is not possible, use morning time if necessary.

3. Animals on the land: If a site is currently being grazed, landowners tend to be especially concerned about trespassing. Try to stay away from any cattle (or bison!) you encounter. Use good judgment.

B. I have indicated on the attached schedule of field work (Appendix 2) the county in which you will be working in any given week. This is meant to serve as a general guide only.

You might be the best judge of the most efficient way to organize this. Here's a list of things you might want to do:

1. Choose sites for the next week from map. Depending on site size, and proximity to one another, you may be able to do 2 or 3 in one morning. For the first few days, you may want to schedule only 1 or 2 a day to give yourself time to go slowly and establish a routine.

2. Study maps of the site to familiarize yourself with it, determine access points, and anticipate any potential survey problems. Don't hesitate to drive out to a site in advance in there is any question.

3. Attempt to contact landowner. This should be attempted several days in advance of when you plan to survey the site. If you find no one home, leave a note with your name and your business, and suggest a time that you will try again.

4. Organize your data sheet: fill in lines 2-4, find and attach the section map. Place the appropriate blueline in your plexiglass map-holder.

VI. Paperwork

A. Keep your site logs up to date.

B. Double check the site identification information (number, name and legal description) on all data sheets.

C. Element Occurrence Records (EOR's): Listed species and communities are referred to as "elements". You have been provided with the actual data entry forms used for the Natural Heritage database, and with detailed information on how to fill them out. You need to be concerned only about the items highlighted in yellow. I think it would be a good idea to fill our a few of these at least to familiarize yourself with the type of information that must be collected. Filling out any more than a few of these forms should be viewed as a low priority activity, to be done if you have nothing else to do, and want to put in some hours. As long as you have recorded your observations carefully on the data sheets, data entry people in St. Paul should have no trouble entering your EO's.

FINALLY, IF YOU HAVE ANY QUESTIONS OR CONCERNS ABOUT HOW THINGS SHOULD BE DONE, PLEASE FEEL FREE TO CALL BON (612-483-9746) OR LEE (612-297-2276) ANYTIME. YOU MAY EITHER CALL ME COLLECT, OR PAY FOR THE CALL YOURSELF, AND BE REIMBURSED.

Table 1. Rare bird species targeted by 1988 CBS survey efforts and counties in which they may occur. Species marked with #1 are primary focus of survey efforts, either because the potential for obtaining good information about their distributions is high, or because there is a great deal of interest in their current status. Less effort will be expended on the other species, either because there is little likelihood of acquiring good information about their distributions (those marked with #2), or because other studies (planned or completed) will provide, or have provided, information about their distributions (those marked with #3). Question marks in the table indicate the presence of potential habitat, but no verified records; X's indicate records from the Natural Heritage database or MOU files of at least inferred breeding (see Appendix 1 for definition of inferred breeding).

	Norman	Clay	Wilkin	Traverse	Big Stone	Lac qui Parle	Washington
#1 Red-shouldered Hawk							?
#1 Yellow Rail	?	?	X				
#1 Upland Sandpiper	X	X	X	?	X	X	?
#1 Marbled Godwit	X	X	X	X	X	X	
#1 Wilson's Phalarope	X	X	X	?	X	X	
#1 Short-eared Owl	?	?	?	?	?	X	
#1 Louisiana Waterthrush							?
#1 Chestnut-collared Longspur		X		X	X	?	
#2 American Bittern	?	?	?	?	?	?	?
#2 Common Moorhen							X
#2 Burrowing Owl		X		?	X	?	
#2 Sprague's Pipit	X	X					
#2 Baird's Sparrow		X					
#2 Henslow's Sparrow	?	X	X	?	?	?	?
#2 Sharp-tailed Sparrow	?	?	X				
#3 Greater Prairie Chicken	?	X	?		?	?	
#3 Sandhill Crane	?		?				
#3 Loggerhead Shrike	?	X	?	?	?	X	X

Appendix 1. Guidelines for acquiring evidence of nesting suitable for entry into Natural Heritage Database.

Guidelines are provided below for the nature of observations that will constitute an EO for each of the bird species that are of special interest for the County Biological Survey field work in 1988, and for how much effort to expend acquiring evidence of nesting. The Natural Heritage database for birds is oriented toward breeding records. Inclusion in the database requires that observations fall into one of three categories of breeding evidence: Positive Nesting (PN), Inferred Nesting (IN), and Inferred Breeding (IB) (see definitions below). PN or IN observations (e.g., a nest, recently fledged young, or adults carrying food) are relatively straightforward, but the IB category requires guidelines that will vary depending on the biology of the species.

While conducting a survey, the observer will need to use his or her own discretion about how much time to spend pursuing observations of birds flushed in an attempt to secure evidence of breeding, keeping in mind that optimum time for survey work is limited, but that evidence of nesting for the listed species is an important goal of the survey work. In general, flushing an individual of one of the listed species in appropriate nesting habitat would justify interrupting the survey for a brief (i.e., 5 minute) search of the immediate area.

Red-shouldered Hawk: Surveys will be conducted in Washington county using playback of Great-Horned Owl vocalizations. Two or more responses at a given broadcast point will be considered IB, as will two or more noncontemporaneous sightings of hunting birds.

Yellow Rail: Because the birds are sedentary and vocalizing is associated with territoriality, one observation of a vocalizing bird will constitute IB.

Upland Sandpiper: A bird giving the advertising "song", or mobbing by one or more birds will constitute IB. A distraction display constitutes IN. If a bird is flushes, remains in area, but doesn't behave aggressively toward surveyor or vocalize, the site should be revisited in about a week to look for better evidence of nesting; a repeat of the previous observation will constitute an IB record.

Marbled Godwit: If the surveyor is mobbed by one or more birds, this will constitute inferred breeding (IB) by at least 1 pair. If a bird is flushed and flies off without evidence of return, this will not constitute a record, and no further action is necessary (because nonbreeders may be present). A flushed bird that settles down again without a fuss should be treated as specified above under Upland Sandpiper.

Wilson's Phalarope: Observations of birds during the breeding season on wetlands near appropriate breeding habitat should be pursued with repeat visits. Two or more such observations in the same area will constitute IB. A flushed bird in nesting habitat should be treated as specified under Upland Sandpiper.

Short-eared Owl: If a bird is observed hunting or is flushed from the ground, the area should be revisited in an attempt to get a repeat observation. Two observations in the same area will constitute IB.

Louisiana Waterthrush, Chestnut-collared Longspur, Henslow's Sparrow, Sprague's Pipit, Baird's Sparrow, or Sharp-tailed Sparrow: A male giving an advertising display will constitute IB. If a non-singing bird is observed, the area should be revisited. Two noncontemporaneous sightings will be IB.

American Bittern: A male vocalizing will constitute IB. Attempts to revisit areas where silent birds were observed will be a low priority.

Common Moorhen: A sighting in appropriate breeding habitat should be pursued with a return visit. Two noncontemporaneous sightings will constitute IB.

Burrowing Owl: Cow pastures with ground squirrel colonies should be checked if they are encountered, especially in Traverse, Big Stone, and Lac qui Parle counties. Any sightings of birds away from obvious colonies should be pursued by revisiting the area.

Greater Prairie Chicken: If a bird is flushed, an immediate check for a nest or young should be made in the vicinity, but revisiting sites where birds were flushed will be a low priority. Observations of broods will constitute IN. Booming grounds are also entered in the database and their location should be noted to the nearest 1/4 1/4 section when possible.

Sandhill Crane: Any sightings of single birds or pairs during our field season should be pursued by a return visit. Observations of more than 2 birds probably represent non-breeders and should be recorded, but need not be followed-up. Observers in Norman county should be especially alert for this species.

Loggerhead Shrike: Sites where initial sightings were made should be revisited. A second observation in the same area will be IB.

In summary: Initial observations that do not fit into the PN, IN or IB categories should be pursued at a later date whenever possible for all species except American Bittern and Greater Prairie Chicken. Observations of the latter two species should be pursued only if time permits.

Categories of avian breeding used for Natural Heritage database

Positive nesting (PN): nest with eggs, adult sitting on nest constantly, or eggshells near nest; young in nest; downy young or young still unable to fly seen away from nest.

Inferred nesting (IN): adults seen building nest, in distraction display, carrying fecal sac, or carrying food; fledglings seen in area.

Inferred breeding (IB): 1) during a standardized breeding bird census, 2 or more noncontemporaneous occurrences of a species at a given observation station within the same season; 2) repeated sight records made at a given location within or between seasons (excluding species known to "loaf" in non-breeding areas such as white pelicans and loons); 3) behavior of birds interpreted by a qualified observer to be territorial or related to nesting, even if based on only one observation.

Appendix 2. Weekly schedule of field activities by surveyor and county. This schedule will be subject to change based on weather conditions and other unforeseen circumstances.

DATE	PERSONS INVOLVED IN SURVEY WORK					
	Schlad-weiler	Rothstein	Harris	Eliason	Fall	Pfannmuller
May 16-21	Clay	LQP	Wash.			
May 22-28	Clay	LQP	Wash.		Clay	LQP
May 29-June 4	Clay	LQP	Wash.	Clay		LQP
June 5-11	Wilkin	Big Stone	Wash.	Clay		
June 12-18	Wilkin	Big Stone	Wash.	Wilkin		
June 19-25	Wilkin	Big Stone	Wash.	Wilkin		
June 25-30	Norman	Traverse	Wash.			

check if plan to revisit ____
date revisited _____

MINNESOTA COUNTY BIOLOGICAL SURVEY - BIRD SURVEY DATA SHEET

Quad map name and code: _____ County: _____
Observer: _____ CBS site #: _____
Subsite legal description: T____N R____W 1/4 sec. _____
Acreage surveyed: _____
Date: _____ Time start: _____ end: _____
Weather: Temp. _____°F. Wind _____ Sky _____
Current land use: _____

Observation categories*
sd♂, usd♂, ad (cf, cm, dd, mo), br, fj, nfj, fo, n(e,y)

SPECIES	OBSERVATIONS	SPECIES	OBSERVATIONS
Marbled godwit		Gray catbird	
Upland sandpiper		Brown thrasher	
Wilson's phalarope		American robin	
Greater prairie chicken		Starling	
		Yellow warbler	
		Common yellowthroat	
		House sparrow	
		Bobolink	
		Western meadowlark	
		Yellow-headed blackbird	
		Red-winged blackbird	
		Brewer's blackbird	
Mallard		Common grackle	
Blue-winged teal		Brown-headed cowbird	
Swainson's hawk		Dickcissel	
Northern harrier		American goldfinch	
American kestrel		Savannah sparrow	
Ring-necked pheasant		Grasshopper sparrow	
Gray partridge		LeConte's sparrow	
Sora		Vesper sparrow	
Killdeer		Clay-colored sparrow	
Mourning dove		Swamp sparrow	
Black-billed cuckoo		Song sparrow	
Great horned owl			
Common flicker			
Eastern kingbird			
Western kingbird			
Willow flycatcher			
Alder flycatcher			
Horned lark			
Tree swallow			
Bank swallow			
Barn swallow			
Blue jay			
Common crow			
House wren			
Sedge wren			

*Observation categories: singing male, unseen singing male, adult (carrying food, carrying nesting material, distraction display, mobbing), brood, flying juvenile, non-flying juvenile, flying over, nest(eggs, young)

Check if continued on reverse _____ BCE, 1988

Species	Observation categories so♂, uso♂, ad (cf, cnm, dd, mo), br, fj, nfj, fo, n(e,y)

Comments: (include here species expected, but not present, and possible reasons; also any reasons to return)

check if based on revisit_____

Minnesota County Biological Survey - Bird Incidental Observation Form

Species: _____ EO(y/n)_____County: _____

Date: _____ Observer: _____ CBS site# _____

# of individuals, age, and sex (if known)_____

Legal description to 1/4 1/4 sec. T_____N R_____W_____

Quad map name and code: _____

How identified (i.e. song, key field marks, etc.)_____

Certainty of identification:_____

Habitat:_____

Behavior:_____

Comments:(if nest, include number eggs or young)_____

BCE,1988

Bird species of particular interest for County Biological Survey

Western Counties

Species	General Habitat
Sprague's Pipit	prairie
Baird's Sparrow	prairie
Marbled Godwit	prairie
Upland Sandpiper	prairie
Chestnut-collared Longspur	heavily grazed prairie
Wilson's Phalarope	prairie, wetlands
Short-eared Owl	prairie, marsh, bog
Sandhill Crane	prairie, marsh, bog
Henslow's Sparrow	rank prairie, old field
Greater Prairie Chicken	prairie, agricultural land
Sharptailed Sparrow	wet prairie, fen, marsh
Yellow Rail	wet prairie, sedge meadow
Burrowing Owl	pastures with ground squirrel burrows
American Bittern	marsh, fen, bog
Loggerhead Shrike	open country with scattered or clustered shrubs or small trees

Washington County

Louisiana Waterthrush	steep wooded ravines with fast moving streams
Red-shouldered Hawk	moist woods, floodplain forest
Common Moorhen	sloughs, swampy lakes
Henslow's Sparrow	rank prairie, old field
Loggerhead Shrike	open country with scattered or clustered shrubs or small trees

Appendix 6. Species lists for selected Washington county sites (Site numbers: 5, 39, 40, 42, 58, 96, 98, 118, 182, 204)

Bird Species list - Washington County Site #5 (Lost Valley Prairie).

Observer: Bruce Fall
Date: 18 June, 1988
Time: 0600-0815
Weather: 61° - 75° F. clear, wind S at 5 mph

SPECIES	NUMBER OBSERVED	COMMENTS
Great blue heron	3	Flying over
Red-tailed hawk	1	Flew from tree on site
Ring-necked pheasant	3	Calling males
Mourning dove	6	3 pairs
Black-billed cuckoo	3	One seen, 2 others calling
Northern flicker	1	
Willow/alder flycatcher	1	
Blue jay	2	
American crow	3	
Black-capped chickadee	7	
House wren	6	
American robin	5	
Gray catbird	14	Most seen, only a few singing
Brown thrasher	9	Most seen or calling, a few singing
Cedar waxwing	2	
European starling	1	
Common yellowthroat	3	
Yellow-breasted chat	1	
Northern cardinal	9	
Rose-breasted grosbeak	1	
Indigo bunting	6	5 singing males, 1 female
Clay-colored sparrow	18	Mostly pairs, males singing
Field sparrow	23	Mostly pairs, males singing
Vesper sparrow	2	
Grasshopper sparrow	1	Singing male
Song sparrow	18	
Red-winged blackbird	3	
Western meadowlark	1	
Common grackle	8	
Brown-headed cowbird	10	
Northern oriole	9	Mostly pairs
American goldfinch	4	

Bird Species List - Washington County Sites 39, 40, 42 (Grey Cloud Dunes).

Observer: Bruce Fall
Date: 12 June, 1988
Time: 0600-1000
Weather: 65-82° F. clear to partly cloudy, wind S at 5-15 mph

SPECIES	Site 39	40	42	COMMENTS
Great blue heron	1	-	-	Flying over from nearby pond
Great egret	3	-	-	Flying over from nearby pond
Mallard	3	-	-	Flying over
Red-tailed hawk	-	-	1	Soaring high overhead
American kestrel	1	1	-	Same bird, hunting over both sites
Ring-necked pheasant	1	-	1	Calling males
Killdeer	2	-	-	Near RR tracks, probably breeding pair
Rock dove	25	1	-	Flying over
Mourning dove	2	4	-	Both flying over & flushed from ground
Belted kingfisher	-	1	-	Flying over
Northern flicker	-	1	1	Flushed from prairie
Great-crested flycatcher	-	-	1	Near NE edge of site
Eastern kingbird	4	4	2	5 pairs, almost certainly nesting
Tree swallow	-	6	-	At least 2 nests
Bank swallow	-	-	5	Flying over
Barn swallow	-	-	1	Flying over
American crow	5	-	5	Flying over
Black-capped chickadee	-	2	-	Near W edge
House wren	2	3	1	All singing males
Eastern bluebird	-	1	1	
American robin	4	-	1	
Gray catbird	2	4	-	Seen, not singing
Brown thrasher	1	4	-	4 singing males total, 1 other seen
Cedar waxwing	-	-	2	Flying over
European starling	2	2	-	Probably nesting site 40
Warbling vireo	2	1	-	Singing males
Northern cardinal	-	1	1	Singing males
Rose-breasted grosbeak	1	1	-	Singing males
Chipping sparrow	-	-	2	Singing males
Field sparrow	10	8	9	At least 12-15 territories total
Vesper sparrow	4	4	1	At least 5 territories total
Grasshopper sparrow	15	3	3	At least 13-15 territories total
Red-winged blackbird	2	-	-	
Eastern meadowlark	2	-	1	Singing males
Common grackle	1	5	-	Flying over
Brown-headed cowbird	4	3	1	
Orchard oriole	2	2	-	2 pairs; nest at site 39
Northern oriole	-	3	1	3 singing males, 1 female seen
American goldfinch	3	-	2	

Bird Species list - Washington County Site #58 (Afton 22).

Observer: Bruce Fall
Date: 18 June, 1988
Time: 1000-1300
Weather: 75° - 88° F. clear, mostly calm

SPECIES	NUMBER OBSERVED	COMMENTS
Ruby-throated hummingbird	1	
Red-bellied woodpecker	2	
Yellow-bellied sapsucker	3	2 territories
Downy woodpecker	1	
Hairy woodpecker	1	
Northern flicker	3	
Eastern wood-pewee	3	
Great-crested flycatcher	3	
Northern rough-winged swallow	3	
Blue jay	4	
Black-capped chickadee	6	
White-breasted nuthatch	3	
House wren	3	
Winter wren	1	Singing male
Blue-gray gnatcathcer	4	3 territories
Veery	1	
Wood thrush	2	2 territories
Gray catbird	1	
Red-eyed vireo	2	
Ovenbird	1	
Louisiana waterthrush	2	2 sites
Mourning warbler	3	2 territories
Scarlet tanager	4	
Northern cardinal	4	
Indigo bunting	4	
Rufous-sided towhee	1	
Chipping sparrow	1	
Song sparrow	6	
Northern oriole	1	
American goldfinch	2	

Bird species lists - Washington county sites 96, 98, and 204
Observer: Bruce Fall

Site #:	96	98	204
Site name:	Fairy Falls	No. Stillwater 15	Brown's Valley
Date:	4 June 1988	19 June 1988	4 June 1988
Time:	0830-1040	0700-0820	1045-1230
Weather:	70-80° F.; p-cloudy, calm	70-80° F.; clear, calm	80° F.; p-cloudy, calm

	Site		
	96	98	204
Double-crested cormorant		10	
Great blue heron			1
Wood duck		2	
Red-tailed hawk		1	
Black-billed cuckoo			1
Ruby-throated hummingbird			1
Belted kingfisher			1
Pileated woodpecker	1	1	
Red-headed woodpecker		1	
Hairy woodpecker		1	1
Downy woodpecker	2	1	
Great crested flycatcher		1	
Eastern phoebe	2	1	2
Eastern wood pewee	4	3	
No. rough-winged swallow	6	2	
Blue jay	2	5	
Black-capped chickadee	2	6	
White-breasted nuthatch		3	
Gray catbird	2		
American robin	6	4	4
Wood thrush		2	
Blue-gray gnatcatcher		3	
Red-eyed vireo	3	3	
Warbling vireo	2		
Louisiana waterthrush	3		2
Northern oriole	4	2	4
Common grackle	2		
Brown-headed cowbird	3		
Scarlet tanager		3	
Northern cardinal	2	2	2
Rose-breasted grosbeak		2	
Indigo bunting	4		1
American goldfinch			1
Rufous-sided towhee		2	
Chipping sparrow		2	1
Song sparrow			2

Bird species list - Washington county site 118 (Grant 14)

Observer: Bruce Fall
Date: 4 June 1988
Time: 0600-0805
Weather: 60-70° F.; clear, calm

Great blue heron	1
Green-backed heron	1
Mallard	2
Wood duck	1
Black tern	3
Red-bellied woodpecker	5
Hairy woodpecker	2
Downy woodpecker	3
Eastern kingbird	2
Great crested flycatcher	5
Eastern wood pewee	4
Tree swallow	4
Northern rough-winged swallow	3
Blue jay	6
Common crow	4
Black-capped chickadee	6+nest
White-breasted nuthatch	2
House wren	5
Gray catbird	8
American robin	5
Blue-gray gnatcatcher	2
Cedar waxwing	4
Warbling vireo	1
Prothonotary warbler	2+nest
Yellow warbler	1
Mourning warbler	1
Common yellowthroat	4
Bobolink	2
Red-winged blackbird	4
Northern oriole	8
Common grackle	10
Brown-headed cowbird	5
Scarlet tanager	1
Rose-breasted grosbeak	12
Indigo bunting	2
American goldfinch	4
Field sparrow	3
Swamp sparrow	2
Song sparrow	5

Bird species list - Washington county site 182 (Cedar Bend White Pines)

Observer: Bon Eliason
Date: 15 June 1988
Time: 0600-0830[1]
Weather: 65°; no wind, sky mostly clear

Route: Walked down hill from Haus residence to stream, followed stream to St. Croix, then walked back upstream from St. Croix about 300 m.[2] Walked to top of valley on south side of stream and along ridge for about 100 m, then down to stream again and retraced route back to Haus residence.

Great crested flycatcher	1
Eastern phoebe	1
Eastern wood pewee	1
Bank swallow	5
Blue jay	3
Common crow	3
Black-capped chickadee	4
White-breasted nuthatch	1
Winter wren	1
Yellow-throated vireo	2
Red-eyed vireo	2
Nashville warbler	1
Cerulean warbler	3
Pine warbler	1
Ovenbird	3
Louisiana waterthrush	1
Common yellowthroat	1
Brown-headed cowbird	2
Scarlet tanager	3
Cardinal	1
Rose-breasted grosbeak	1
Chipping sparrow	4

[1] Singing had declined noticably by 0800.

[2] Noise from rushing water in stream made it very difficult to hear birds.

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Minnesota Department of Natural Resources, Section of Wildlife
Natural Heritage and Nongame Wildlife Programs
Box 7, 500 Lafayette Road
St. Paul, MN 55155
(612) 296-3344